



Monitoring Times

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Equipment - Computers

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Scanning Louisiana's Trunked System

MT Reviews:
PRO-2096
Eton E10
Flex Radio
SDR-1000
Nightlogger II
ZAP 270

**Narrowbanding
And Your Scanner**

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Monitoring Times

Vol. 24, No. 6

June 2005



Cover Story

Louisiana's Trunked Radio System

By John Mayson

As the gateway to the Mississippi, Louisiana was important to US interests even before its purchase in 1803. Today, scanner listeners have virtually statewide access through the Motorola Type II Smartzone system which links public safety agencies throughout Louisiana.

MT presents a parish-by-parish look at major agencies and talk-groups for control-channel scanning of Louisiana's Trunked Radio System.

On our cover: Jackson Square, a popular New Orleans tourist destination. Photo by Gayle Van Horn.

C O N T E N T S

Narrowbanding and Your Scanner 14 By David Stark

"My scanner can't display all those digits. Will I still be able to hear the conversations?" "Should I buy a new scanner now or wait until a narrowband scanner comes out?" "My scanner already has FM-Narrow mode, so what's the big deal?"

To conserve spectrum, the FCC has cut the VHF/UHF bandwidths in half, and these new channels are now beginning to show activity. However, scanner production has not kept pace with the new channel assignments. Does this mean your scanner is obsolete? Not necessarily. Here's some background on the new bandplans and how they will affect your listening.

Birth of a Station 16 By Todd Van Gelder

In an age when change proceeds at a dizzying pace, it's nice to know that good old AM is still the workhorse when it comes to getting out information. At the National Institutes of Health, progress meant constantly-changing traffic patterns, confusion, and frustration. Travelers Information Station KFQ-70 came to the rescue.

Hello from Alfa Lima International 17 By Alfred E. Zoer

This European pirate provides a brief introduction to his well-known unlicensed shortwave station and the pirate scene in general.

On Writing Club Newsletters 18 By Arthur R. Lee

Don't think you have any skill or material to contribute to your group's publication? Think again! Arthur Lee shows how simple it can be, how beneficial it can be to your club, and how much fun you can have doing it!

Reviews:

Our First Look at Radio Shack's new portable Pro-2096 scanner shows it to be a worthy performer, easy to program, and loaded with features. With a few exceptions, it can be recommended for most scanning applications (page 70).

The versatile Eton E10 covers AM, FM and shortwave in a lightweight, compact radio, perfect for travel or office use. Check out this affordable digital on page 69.

To all those who recommended John Catalano take another look at the Flex Radio SDR-1000 using a recommended sound card,

you can now say, "I told you so!" (See p.72)

The Nightlogger II should be subtitled the "Hobbyist's Friend." This handy gadget will control your tape recorder for long duration, unattended monitoring to catch those elusive signals in any part of the spectrum.

An RF meter has many uses, including locating bugs, measuring RF fields around electronic devices, locating sources of interference, and more. The new ZAP 270 shows increased sensitivity to higher-frequency signals and can be used with a directional antenna to pinpoint signal sources (page 68).



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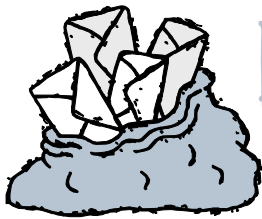
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LETTERS TO THE EDITOR

Trains and Transportation

"You said you'd like to know how the new feature *Boats, Planes and Trains* was being received. I quite enjoy reading these articles. Monitoring boats, planes and trains is a great pastime, and this column is terrific. I especially liked the issue in which Ron Walsh gave both HF and VHF maritime radio frequencies. Please keep this feature coming. Thanks."

— Chris Boyd

"Love the PDF version. I don't have to ransack the house for my back issues anymore."

"I was also very pleased to see the return of a transportation column. There are many utility fans that aren't hams or police groupies; at least I hope there are."

"Glad you sent Mr. Sturm my compliments; he wrote a review of the Relm HS-100 scanner for his website, said it was very good on the rail bands, so I bought one (the Racing Electronics RE2000 version) back in '99 or so — and sure enough, it was one of the best scanners I've ever owned, perhaps the best. I'm considering the purchase of another one."

— mu 23 [mu23@msn.com] <http://www.mdrails.com>

"Bob, just thought I would drop a note to you and let you know how valuable the AOR AR8200 Mark III was to use this past week. We use a Remote Control System for operating Locomotives in some of our yards in the 450 MHz range. The system at Hamlet, NC, was having problems dropping off line after midnights. Using a Spectrum Analyzer we were able to determine that it was an interference problem, which we were able to locate from a vehicle using an AR8200 Mark III and a directional antenna."

"It was a frustrating problem due to the intermittent nature of the trouble, but the 8200 made tuning and finding the offender a piece of cake when it was on the air. We installed a directional antenna and were able to restore service while we search for a clear channel to use. The search is being done using this same receiver and Scancat Gold SE to scan and log hits on the channels available in this range."

— Dave Fouchey, Manager Communications, CSX Transportation

It's good hear from a few of you regarding the transportation column, now in its second year. I'm glad to know you like it, because the writers love what they do!

— Rachel Baughn

In Sympathy

We extend our sympathy to the family of Azizul Alam Al-Amin of Bangladesh, who wrote the guest editorial for this column in April

("Preserve Analog Shortwave Broadcasting"). He wrote, "I am very much shocked that on 28 March my uncle Md. Ataur Rahman Al-Amin died by heart-attack. He was the father of 4 year old Turjo (shown in the photograph here and in the April article). I really miss him because he was always encouraged and advised me especially in radio listening."



Thanks Back Atcha

Ken Windyka posted the following letter on a yahoo newsgroup after we posted the "annual airshow guide" to the *MT* website. Thanks, Ken, for the support and encouragement, especially in posting this "sales pitch" to other hobbyists.

"Thank you very much *Monitoring Times* magazine and Larry Van Horn, *Milcom* columnist."

"I think that most hobbyists on this list would agree that *MT* provides many 'free' services as well as *MT* monthly articles which contain 'factual' information that can readily be put to use by the monitoring hobbyist to more fully enjoy the milcom aspect of the hobby!"

"It's especially noteworthy that a current edition article would be posted for free on the web page for all to download, rather than just doing a first paragraph summary to hook folks into buying the magazine — You don't see that from any other (commercial) hobby publication!"

"Additionally, I think that everyone should give serious consideration to subscribing to *Monitoring Times* magazine. it's well worth the money spent!"

"I also know that Larry has worked very diligently in producing quality reference publications over the years, such as *Military Frequency Directory* 2nd edition, *Federal Frequency Directory*, 2nd edition, and *Grove Shortwave Directory*, 9th edition. These publications also IMHO greatly aid the milcom hobbyist and are both an efficient and cost effective way of having information readily available."

"Bob Grove, Larry Van Horn, *Monitoring Times*, Grove Enterprises, et al, over the years

have ALWAYS supported the monitoring hobby with loads of free information."

Thanks again — Ken Windyka

Correction

The wrong web site was given for Bruce Elving's FM Atlas in the April feature on "The Changing World of FM DX." The website is <http://members.aol.com/fmdxer> Thanks to Ken Reitz and Judy May for calling it to our attention.

Listening Post Pin-up

"I recently rearranged my listening post, so that it would be more convenient for me to operate. In order to stack all of my equipment so that I could control each piece without having to move my left arm too far beyond what I am capable, I purchased a Fellowes keyboard/monitor riser which included a pullout keyboard tray. The dimensions of this product were ideal, given the sizes of the equipment I am using and the deck space I wanted to allot to this function. I use a Kenwood R-5000 receiver, a Realistic PRO-2005 scanner, a Radio Shack tape recorder and external speaker. The height of the riser was not too high, which was a plus for me."

"Since I didn't need the keyboard tray, I removed it, leaving me with the riser section that has space underneath for the scanner and tape recorder, and adequate room on top for the shortwave receiver and speakers. I am using a Sony AN1 active antenna placed on the window sill of my ninth floor apartment, so reception is fairly good with electrical noise only periodically a problem."

— Brian Limbach, Pittsburgh, PA



We welcome your ideas, opinions, corrections, and additions in this column. Please mail to **Letters to the Editor**, 7540 Highway 64 West, Brasstown, NC 28902, or email editor@monitoringtimes.com. Letters may be edited for length and clarity.
Happy monitoring!

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SCANNING

New Development in Michigan

Law-abiding citizens in Michigan will no longer need permission to have radio scanners in their vehicles if legislation introduced by state Rep. Kevin Elsenheimer becomes law.

House Bill 4544 eliminates the requirement for an amateur radio operator license or permit from the state police to carry equipment that receives assigned public safety frequencies.

"The current law is a well-intended effort to keep criminals from hearing what the police are doing," said Elsenheimer, R-Bellaire. "The reality is that anyone with criminal activity in mind will not ask for a permit, so only law-abiding residents are going through the paperwork and red tape. We need to ensure the bad guys are punished, not make it difficult for people with a hobby."

The bill eliminates the requirement for individuals to acquire a permit from state police and simply makes using a radio scanner for purposes of committing a crime illegal, punishable by a \$1,000 fine and one year in jail, the same penalty currently for not having a license or permit for the radio.

The House Judiciary Committee is reviewing the legislation. If you are a Michigan resident, contact your representative and encourage him or her to support this enlightened bill.

AVIATION

Flight Service Stations

On October 1, 2005, management of the Federal Aviation Administration's Flight Service Stations will be turned over to Lockheed Martin, which won a 5-year contract (plus 5-yr option) to modernize and maintain this critical aviation support system. The FAA expects to see a savings of \$2.2 billion over 10 years under Lockheed's proposed management plan.

Over the next two years Lockheed plans to close 38 of the current 58 service stations and reduce personnel by several hundred. Some service staff may be able to remain with the FAA by helping to fill an urgent need for flight controllers, some will be offered a retirement package with federal benefits, and others will transition to Lockheed, thereby losing their federal pension and benefits.

The move is being contested by the National Association of Air Traffic Specialists (NAATS). Skeptics questioned whether the motivation for the timing of the contract offer was the large number of employees who would soon be drawing pensions they will now lose, but the FAA says the timing is coincidental and the system was simply becoming too outdated and costly.

Lockheed plans an automated flight service network which must meet some stringent

requirements, such as acknowledging radio calls within 5 seconds, delivering requested information or filing urgent weather reports within 15 seconds, and posting flight plans within three minutes of filing.

Coincidentally, Lockheed Martin awarded a 10-year contract to SES Americom to support the space-based navigation services of the Federal Aviation Administration (FAA). This service will support communications in the FAA's Wide Area Augmentation System (WAAS) and allow broadcasting of navigation messages 24-hours a day, seven days a week.

BROADCASTING

Schools Win

Remember the attempt to grab school stations we reported on in January? The FCC rejected six attempts by Marty Hensley, the director of Hoosier Public Radio Corp., to force several educational radio stations to share their airtime.

In March, the Federal Communications Commission granted license renewals this month to six of the eight stations targeted by Hensley and rejected his petitions to force those stations to share airtime with his nonprofit company.

Taliban Clandestine Radio

Accusing available world media and local start-up broadcasters as all being too pro-American, Afghanistan's Taliban guerrillas launched a clandestine radio station in mid-April, broadcasting anti-government commentaries and Islamic hymns from a mobile transmitter.

Called "Shariat Shagh," or Voice of Shariat, after the station the Taliban ran while in power, the broadcast is heard in the five southern provinces, the former regime's old power base, between six and seven o'clock mornings and evenings.

Taliban attacks have picked up since the winter, but have not reached previous levels. The dip in activity plus this new clandestine broadcast fuel speculation that the movement may be struggling to find recruits and resources. However, desperate is still dangerous, warns commander of U.S. forces in Afghanistan, Lieutenant-General David Barno.

Attacks in Colombia

While opposition groups may set up clandestine stations to promote their causes, they may also attempt to disrupt the flow of information from government and other licensed broadcasters.

An Organization of American States (OAS) official, Eduardo Bertoni, expressed concern about recent attacks against legitimate broadcasters in Colombia. Armed men planted explosives near the transmission towers for radio stations Cristalina Estéreo and Espléndida Estéreo, located near the city of Florencia in the Colombian department (province) of Caquetá.

In February the antenna for radio station Latina Estéreo in the southern Colombian town of Puerto Asís was destroyed by various unidentified individuals, who planted explosives to burn down the transmission station as well.

Also in February, a car bomb destroyed the radio and television studios of station RCN in the city of Cali. The illegal insurgent group known as the Revolutionary Armed Forces of Colombia (FARC) claimed responsibility for that attack, said the OAS official. He also reported that the transmission station of two television channels in Putumayo was destroyed in early March by several heavily armed men, who spread gasoline and set fire to the interior of the building.

Bertoni pointed to a public commitment made by heads of state to the principle that countries in the region will ensure that "journalists and opinion-leaders are free to investigate and publish without reprisals."

Radio the Real Cause of Skin Cancer?

A scientific paper disputes findings that the sun is the cause of the rise of malignant melanoma in Sweden, Norway, Denmark and the USA. Instead, the authors claim, "we found a strong association between the introduction of FM radio broadcasting at full-body resonant frequencies and increasing melanoma incidence."

Their analysis of data indicates a correlation between the rollout of FM/TV broadcasting networks and increased melanoma cases beginning in 1955, whereas large-scale travel to sunny locations for the winter began seven years later.

"Conclusions: The increased incidence and mortality of melanoma of skin cannot solely be explained by increased exposure to UV-radiation from the sun. We conclude that continuous disturbance of cell repair mechanisms by body-resonant electromagnetic fields seems to amplify the carcinogenic effects resulting from cell damage caused e.g. by UV-radiation."

Read it for yourself at http://www.med-scimonit.com/pub/vol_10/no_7/4321.pdf

New Morse Station

The Maritime Radio Historical Society (MRHS) was formed in 1999 with the aim of restoring ex-RCA coast station KPH to op-



RCA "K" set being tuned by Tom Horsfall

erational status. After a year of discussion and planning, the MRHS submitted an application to the FCC for a new class 1A common carrier public coast station. Even though all the provisions for licensing a station of this type were still in the rules, it was uncertain whether the license would be granted since no such license had been issued by the FCC for many years. But the license was duly issued, with the call sign KSM.

See more on this historic station in this month's *Utility World*, and at <http://www.radiomarine.org>

CITIZENS BAND

CB to the Rescue in Iraq

Hometown supporters of the 1544th Transportation Company of the Illinois Army National Guard have raised about \$10,000 to buy radios and Global Positioning System receivers since the unit deployed to Iraq last spring.

Friends, family members and Paris, Illinois, area businesses decided to buy 90 citizens band (CB) radios for the local unit's soldiers because the unit had only about 13 Army-furnished Single-Channel Ground and Airborne Radio System (Singcars) radios when it deployed to share between 63 vehicles.

The CB radios now allow all the vehicles in a convoy to communicate with one another when they trigger a mine or the roadside bombs. Robert Sinclair, a former member of the 1544th, says that with five people killed and more than 20 wounded, he is convinced the CB radios have saved lives by giving the soldiers a means to quickly call for help.

He says the soldiers of the 1544th exercise strict communication discipline with the nonmilitary radios, using the CBs only if they have been attacked or have struck a bomb. "At that point, the enemy already knows where you are," he added.

Besides the CB radios, Sinclair said supporters of the 1544th also bought 10 Rino 120 GPS receivers from Garmin. The Rino 120s also have built-in two-way radios, but Sinclair said members of the 1544th primarily use the devices as GPS receivers.

Col. Al Woodhouse, director of current operations in the Army's Office of the Chief Information Officer, said Army officials planned to ship more than 40,000 radios to troops in Iraq by April 2005 to make up for a shortage that has forced active, National Guard and Reserve units to buy their own equipment.

HI-TECH

Force Field Wireless makes products that it says can dramatically reduce the leakage of wireless signals from (or into) a room or building. DefendAir Radio Shield latex paint contains copper filings and an aluminum compound. When spread evenly on a wall, the

paint reflects signals in frequencies from 100 MHz to 5 GHz. Paint four walls, a floor, and a ceiling, and you effectively have a Faraday cage, which is a specially constructed metal room that blocks all radio signals in or out.

Besides the paint, Force Field sells 32 ounces of a copper/aluminum powder that homeowners can add to their own paint for \$34. The company also makes a window film that cuts down on signal leakage: A 30-inch-by-25-foot roll is priced at \$45.

There are drawbacks to the paint. Not only does it block interference from other wireless systems, it also blocks over-the-air television and mobile-phone signals.

Convincing consumers to take wireless security seriously has been harder than convincing businesses. "They see it like tinfoil on your head," cofounder Harold Wray says. "They think it's kind of paranoid."

Communications is compiled by Rachel Baughn (editor@monitoringtimes.com) from news stories submitted by our readers. Many thanks to this month's fine reporters: Anon, Md Azizul Alam Al-Amin, Mark Bajek, John Mayson, Jerry None, Michael Reynolds, Doug Robertson, Brian Rogers, Robert Thomas, Larry Van Horn, and Ed Yeary.



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State of Louisiana Trunked Radio System

By John Mayson

In the year 1802, President Thomas Jefferson wanted to purchase the city of New Orleans since it controlled the mouth of the Mississippi River. The river was important for shipping goods to and from parts of the country west of the Appalachian Mountains. The United States had a treaty with Spain allowing access to the Port of New Orleans. However, Napoléon Bonaparte had restored Louisiana to French control and the Americans feared the loss of access to the city's ports.

President Jefferson sent James Monroe and Robert R. Livingston to Paris to negotiate the purchase of New Orleans and the land east of the city. The American negotiators were prepared to spend \$2 million for the purchase, but were stunned to learn that Bonaparte was willing to sell all of the French land between the Mississippi River and Rocky Mountains for \$22.5 million or a mere three cents per acre.

The United States and France signed the Louisiana Purchase Treaty on April 30, 1803, which Congress ratified on October 20 of the same year. The purchase doubled the size of the United States and the funds paid to France helped Napoléon build an army that would defeat Austria, Prussia, and Russia and make him the master of most of Europe.

France turned New Orleans over to the United States on December 20, 1803. Dignitaries from both nations were present. It would have been a wonderful scanning event, except that the radio had not yet been invented. In fact, Marconi had not yet been born.

Fortunately, scanner owners today have the opportunity to monitor a statewide trunked radio system in the great state of Louisiana.

Louisiana used a mix of low-band, VHF, and UHF frequencies before their trunked system came online in 1987. Originally only the Louisiana State Police used the system, but, over time, many local, state, and federal agencies have joined the system. The Louisiana TRS is a Motorola Type II Smartzone system and allows users to communicate from anywhere in the state. Scanner listeners in Louisiana have heard sheriff's offices from 100 miles away on their local repeater.

Louisiana is divided into parishes in the same way that other states are divided into counties. Colonial Louisiana was officially Roman Catholic and both the Spanish and French rulers

applied ecclesiastical governing units. Many of the parish names retain the previous church parish names.

Frequencies

Louisiana is a mid-sized state which requires forty-six towers encompassing hundreds of frequencies (see Table 1). It's impractical to fill up a scanner with nothing but the state's trunked radio system. A tip I give to folks monitoring wide-area Motorola trunked systems is to program only the control channels and set the bank to "control channel only" mode. I use this method while traveling both I-10 and I-20 and it works great (see Table 2).

The system also supports the nationwide I-TAC frequencies plus a State Police talkaround channel (TAC) (see Table 3).

Users

A number of local, state, and federal agencies use Louisiana's trunked radio system. We'll only concentrate on the "action" talkgroups. A complete list of talkgroups can be found in *Police Call* or online at <http://www.radioreference.com> and bellsouthpwp.net/k/d/kd5eis/.

Louisiana State Police

The primary user of the state's trunked radio system is the Louisiana State Police (LSP). The LSP has its roots in the Louisiana Highway Commission. In 1922 Louisiana saw its first attempt at law enforcement at the state level. The state had 2,700 miles of road and over 100,000 vehicles. The Highway Commission created a team of 16 men who patrolled the state's highways on motorcycles. During the two-year period between 1922 and 1924 they reported 114 serious accidents and 18,918 traffic violations.

The 1928 the force had grown to seventy uniformed officers and the state was divided into three administrative districts. They gained additional law enforcement duties including the Bureau of Criminal Investigation that dealt with non-traffic related crimes and in 1932 they were authorized to carry firearms.

In 1936 the state legislature passed a bill creating the Department of State Police. General Louis F. Guerre, whose surname translates to "war," modeled his newly created department

after J. Edgar Hoover's famous "G-Men." The LSP was divided into eleven districts with a total of 146 patrol officers. Six years later the legislature abolished the Department of State Police and created the Department of Public Safety. Prior to 1946 Louisiana did not require driver's licenses, but issuing them became yet another duty of the State Police.

The State Police took on yet another role in the mid-1990s when the legislature approved gambling. The Louisiana Gaming Control Board (LGCB) falls under the State Police. Each troop has a LGCB talkgroup.

Today the LSP has 1,022 men and women responsible for all elements of criminal and highway safety interdiction in the state. They have a distinguished record of keeping Louisiana's highways safe, assisting during hurricanes and floods, and protecting civil rights protestors during the turbulent 1960s.

The LSP is divided into two regions and nine troops (see figure 1). Region I is headquartered in Baton Rouge and encompasses troops A, B, C, and L. Region III is headquartered in Alexandria and encompasses troops D, E, F, G, and I. There is no Region II.

LSP Statewide Talkgroups

These talkgroups are common to all nine troops and may be heard across the state.

Talkgroup	Description
5776	Headquarters
6576	Task Force 1
6608	Task Force 2
6640	Task Force 3
6672	Task Force 4
6704	Task Force 5
6736	Task Force 6
6768	Task Force 7
6800	F1



7056 F2
7088 TAC 1
7120 TAC 2
7152 TAC 3
7184 TAC 4

LSP Troop A Talkgroups

Troop A is headquartered in Baton Rouge and led by Capt. Aaron Chabaud. Troop A includes the following parishes: Ascension, East Baton Rouge, East Feliciana, Iberville, Livingston, Pointe Coupe, West Baton Rouge, and West Feliciana. It includes the state capital of Baton Rouge.

Talkgroup	Description
16	F1 Dispatch
48	F2
144	Car to Car
176	Gaming
208	Narcotics
240	Criminal Investigations
272	Executive Security
304	Department of Public Safety
336	LSP-1
368	LSP-2
400	Coordinate Call
432	Coord/Talk-1
464	Coord/Talk-2
496	Emergency
528	Safety Enforcement
560	State Fire Marshals

LSP Troop B Talkgroups

Troop B is headquartered in Kenner and led by Capt. Brian Etland. Troop B includes the following parishes: Jefferson, Orleans, Plaquemines, St. Bernard, St. Charles, and St. John. It includes the metropolitan New Orleans area.

Talkgroup	Description
656	F1 Dispatch
688	F2
784	Car to Car
816	Gaming (LGCB)
848	Narcotics
880	Criminal Investigations
912	Executive Security
944	Department of Public Safety
976	LSP-1
1008	LSP-2
1040	Coordinate Call
1072	Coord/Talk-1
1104	Coord/Talk-2
1168	Safety Enforcement
1200	State Fire Marshals

LSP Troop C Talkgroups

Troop C is headquartered in Gray and led by Capt. Val Penouilh. Troop C includes the following parishes: Assumption, Lafourche, St. James, and Terrebonne.

Talkgroup	Description
1296	F1 Dispatch
1328	F2
1424	Car to Car
1456	Gaming (LGCB)
1488	Narcotics
1520	Criminal Investigations
1552	Executive Security
1584	Department of Public Safety
1616	LSP-1
1648	LSP-2
1680	Coordinate Call
1712	Coord/Talk-1
1744	Coord/Talk-2
1808	Safety Enforcement
1840	State Fire Marshals

LSP Troop D Talkgroups

Troop D is headquartered in Lake Charles and led by Capt. Russell Haman. Troop D includes the following parishes: Allen, Beauregard, Calcasieu, Cameron, Jeff Davis.

Talkgroup	Description
1936	F1 Dispatch
1968	F2
2064	Car to Car
2096	Gaming (LGCB)
2128	Narcotics
2160	Criminal Investigations
2192	Executive Security
2224	Department of Public Safety

2256 LSP-1
2288 LSP-2
2320 Coordinate Call
2352 Coord/Talk-1
2384 Coord/Talk-2
2448 Safety Enforcement
2480 State Fire Marshals

LSP Troop E Talkgroups

Troop E is headquartered in Alexandria and led by Capt. Terry Ward. Troop E includes the following parishes: Avoyelles, Catahoula, Concordia, Grant, LaSalle, Natchitoches, Rapides, Sabine, Vernon, and Winn.

Table 1. Louisiana TRS frequencies

City	Parish	Frequencies
Abbeville	Vermilion	852.6625, 853.1375, 853.5875, 854.0875, 855.0125, 855.9875*
Alexandria	Rapides	851.6875, 852.6625, 853.6125, 854.5625, 855.5125, 867.3625, 867.8875, 868.4375*
Angola	West Feliciana	856.7625, 857.7625, 858.7625, 859.7625*
Baton Rouge	East Baton Rouge	856.2375, 856.4625, 858.2375*, 859.2375*, 866.2250, 866.5375, 866.9500, 867.6125, 868.0250, 868.4875, 868.7375, 868.9875
Bellevue	Bossier	857.2625, 858.2625, 859.2625, 860.2625*
Bernice	Union	854.9125, 855.8625, 858.2625, 860.2625*
Berwick	St. Mary	857.9875, 858.9875, 859.4375, 859.9875, 860.9875*, 867.1875, 868.0500
Bridge City	Jefferson	852.1875, 854.0875, 855.0125, 857.7625, 858.7625, 859.7625*, 860.7625*, 867.2625
Buras	Plaquemines	856.2375, 858.2375, 859.2375*, 860.4625
Calhoun	Ouachita	855.9875, 856.9625, 857.9625, 858.9625, 859.9625*
Columbia	Caldwell	854.9875, 856.2125, 857.2125, 860.4875*
Covington	St. Tammany	866.2625, 866.5375, 866.7875, 867.0625, 867.3125*, 868.4250
DeQuincy	Calcasieu	856.4625, 856.7625, 857.4625, 858.4625*
Ferriday	Concordia	866.2625, 866.6750, 868.4125, 868.9125*
Geismar	Ascension	851.5625, 852.0625, 853.0125, 853.9625, 854.4375, 854.9125, 855.8875*
Goudeau	Avoyelles	856.9875, 857.9875, 858.9875, 859.9875*
Gray	Terrebonne	857.4625, 858.4625, 859.4625, 860.4625, 860.9625*
Greensburg	St. Helena	856.4375, 857.4375, 858.4375, 859.4375, 860.4375*
Hackberry	Cameron	857.9625, 858.9625, 859.4625, 859.9625, 860.9625*
Hammond	Tangipahoa	866.1750, 866.7500, 867.2750, 867.8250*, 868.2000, 868.9375
Homer	Claiborne	857.4375, 858.4375, 859.4375, 860.9625*
Jackson	East Feliciana	852.1875, 853.1375, 854.0875, 855.0125, 855.9875*
Jeanerette	Iberia	866.3625, 867.1625, 867.8375, 868.4375, 868.9375*
Jena	La Salle	856.4625, 857.7625, 858.4625, 860.7625*
Jonesboro	Jackson	857.2375, 858.2375, 859.2375, 860.2375*
Lake Charles	Calcasieu	866.1875, 867.2125, 867.7625, 868.2625, 868.8875*
Laplace	St. John	866.0625, 866.6625, 867.1875, 867.7125*, 868.0500, 868.7875*
Larose	Lafourche	856.9625, 857.9625, 858.9625, 859.9625*, 867.8625, 868.5750
Leesville	Vernon	855.4625, 855.9875, 859.4625, 860.4625*
Mansfield	De Soto	856.9875, 857.9875, 858.9875, 859.9875*
Many	Sabine	857.9625, 858.9625, 859.9625, 860.9625*
Marion	Union	856.7375, 857.7375, 858.7375, 859.7375, 860.7375*
Oak Grove	West Carroll	856.2375, 857.4625, 858.4625*, 860.7125
Oakdale	Allen	866.1000, 866.7250, 867.7250, 868.3750*, 868.9125
Plain Dealing	Bossier	856.9625, 857.9625, 858.9625, 859.9625*
Ramah	Iberville	866.3750, 866.5625, 866.9125, 867.8125, 868.3625, 868.8625*
Ringgold	Bienville	856.7625, 857.7625, 858.7625, 859.7625, 860.7625*
Rockefeller	Cameron	856.7125, 857.7125, 858.7125, 859.7125, 860.7125*
Rosepine	Vernon	856.2375, 857.2375, 858.2375, 859.2375*
Sheridan	Washington	856.9625, 857.9625, 858.9625, 859.9625*
Shreveport	Caddo	856.4625, 858.4625, 859.4625, 860.4625*, 866.3875
Slidell	St. Tammany	857.4625, 858.4625, 859.4625*, 867.1625, 867.6125, 868.0375, 868.0500
Sunset	St. Landry	852.1875, 856.4375, 857.4375, 858.4375, 860.2375*, 860.4375
Tallulah	Madison	857.2375, 858.2375, 859.2375, 859.4375, 860.2375*
Wheeling	Winn	857.4375, 858.4375, 859.4375, 860.4375*
Woodlawn	Assumption	854.9875, 857.7625, 858.7625, 859.7625, 860.7625*

Asterisks (*) indicate control channels



Talkgroup	Description
2576	F1 Dispatch
2608	F2
2704	Car to Car
2736	Gaming (LGCB)
2768	Narcotics
2800	Criminal Investigations
2832	Executive Security
2864	Department of Public Safety
2896	LSP-1
2928	LSP-2
2960	Coordinate Call
2992	Coord/Talk-1
3024	Coord/Talk-2
3088	Safety Enforcement
3120	State Fire Marshals

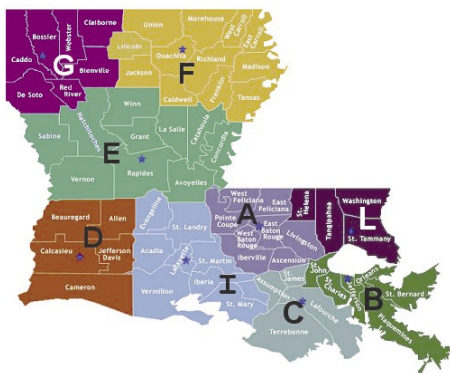
LSP Troop F Talkgroups

Troop F is headquartered in Monroe and led by Capt. Don McDonald. Troop F includes the following parishes: Caldwell, East Carroll, Franklin, Jackson, Lincoln, Madison, Morehouse, Ouachita, Richland, Tensas, Union, and West Carroll.

Talkgroup	Description
3216	F1 Dispatch
3248	F2
3344	Car to Car
3376	Gaming (LGCB)
3408	Narcotics
3440	Criminal Investigations
3472	Executive Security
3504	Department of Public Safety
3536	LSP-1
3568	LSP-2
3600	Coordinate Call
3632	Coord/Talk-1
3664	Coord/Talk-2
3728	Safety Enforcement
3760	State Fire Marshals

LSP Troop G Talkgroups

Troop G is headquartered in Bossier City and led by Capt. Ron Whittaker. Troop G includes the following parishes: Bienville, Bossier, Caddo, Claiborne, De Soto, Red River, and Webster. It includes the metropolitan Shreveport area.



Talkgroup	Description
3856	F1 Dispatch
3888	F2
3984	Car to Car
4016	Gaming (LGCB)
4048	Narcotics
4080	Criminal Investigations
4112	Executive Security
4144	Department of Public Safety
4176	LSP-1
4208	LSP-2
4240	Coordinate Call
4272	Coord/Talk-1
4304	Coord/Talk-2
4368	Safety Enforcement
4400	State Fire Marshals
6448	Supervisors Regroup

LSP Troop I Talkgroups

Troop I is headquartered in Lafayette and led by Capt. Walter "Tommy" Legendre. Troop I includes the following parishes: Acadia, Evangeline, Iberia, Lafayette, St. Landry, St. Martin, St. Mary, and Vermilion.

Talkgroup	Description
4496	F1 Dispatch
4528	F2
4624	Car-to-Car
4656	Gaming (LGCB)
4688	Narcotics
4720	Criminal Investigations
4752	Executive Security
4784	Department of Public Safety
4816	LSP-1
4848	LSP-2
4880	Coordinate Call
4912	Coord/Talk-1
4944	Coord/Talk-2
5008	Safety Enforcement
5040	State Fire Marshals

LSP Troop L Talkgroups

Troop L is headquartered in Mandeville and led by Capt. Luke Pingno. Troop L includes the following parishes: Livingston, St. Helena, St. Tammany, Tangipahoa, and Washington.

Talkgroup	Description
5136	F1 Dispatch
5168	F2
5264	Car to Car
5296	Gaming (LGCB)
5328	Narcotics
5360	Criminal Investigations
5392	Executive Security
5424	Department of Public Safety
5456	LSP-1
5488	LSP-2
5520	Coordinate Call
5552	Coord/Talk-1
5584	Coord/Talk-2
5648	Safety Enforcement
5680	State Fire Marshals

Louisiana Department of Transportation and Development (DOTD)

Dr. Kam Movassaghi leads the Louisiana DOTD staff 5,300 with a budget of \$1.1 billion. The department is responsible for highway construction, tourism, motorist assistance, and the Louisiana Offshore Oil Port.

At first glance agencies such as DOTD could seem like ho-hum monitoring. However, during events such as hur-

Table 2. Statewide list of control channels

855.8875	855.9875	858.2375
858.4625	859.2375	859.4625
859.7625	859.9625	859.9875
860.2375	860.2625	860.4375
860.4625	860.4875	860.7125
860.7375	860.7625	860.9625
860.9875	867.3125	867.7125
867.8250	868.3750	868.4375
868.7875	868.8625	868.8875
868.9125	868.9375	

ricanes, floods, ice storms, and major construction they become valuable sources of information.

The DOTD is divided into nine districts.

DOTD District 2

District 2 includes Jefferson, Lafourche, Orleans, Plaquemines, St. Bernard, St. Charles, St. John, and Terrebonne parishes. This district includes the metropolitan New Orleans area.

Talkgroup	Description
8656	Main
8688	Auxiliary
8720	Weight Enforcement
8752	Unknown
8784	Communications
8848	Maintenance

DOTD District 3

District 3 includes Acadia, Evangeline, Iberia, Lafayette, St. Landry, St. Martin, St. Mary, and Vermilion parishes. St. Martin parish has a geographical oddity. The parish is not contiguous. Iberia parish slices St. Martin in two. During the early 19th century St. Mary parish was created from parts of St. Martin and Iberia. This coupled with a surveyor's error resulted in St. Martin parish being divided.

Talkgroup	Description
8880	Main
8912	Auxiliary
8944	Weight Enforcement
8976	Unknown
9008	Communications
9040	Traffic Services
9072	Maintenance

DOTD District 4

District 4 includes Bienville, Bossier, Caddo, Claiborne, Desoto, Red River, and Webster parishes. The district includes the metropolitan Shreveport area.

Talkgroup	Description
9552	Main
9584	Auxiliary
9616	Weight Enforcement
9648	Unknown
9680	Communications
9712	Traffic Services
9744	Maintenance

Table 3. Louisiana state conventional frequencies

Description	Output	Input	CTCSS
Mutual Aid TA-ALL	867.4875	867.4875	82.5
Mutual Aid I-CALL	866.0125	821.0125	156.7
Mutual Aid ITAC 1	866.5125	821.5125	156.7
Mutual Aid ITAC 2	867.0125	822.0125	156.7
Mutual Aid ITAC 3	867.5125	822.5125	156.7
Mutual Aid ITAC 4	868.0125	823.0125	156.7
LSP TAC	867.4625	867.4625	

DOTD District 5

District 5 includes East Carroll, Jackson, Lincoln, Morehouse, Ouachita, Richland, Union, and West Carroll parishes. This district includes the metropolitan Monroe area.

Talkgroup	Description
9776	Main
9808	Auxiliary
9840	Weight Enforcement
9872	Unknown
9904	Communications
9936	Traffic Services
9968	Maintenance

DOTD District 7

District 7 includes Allen, Beauregard, Calcasieu, Cameron, and Jeff David parishes. This district includes the metropolitan Lake Charles area.

Talkgroup	Description
9104	Main
9136	Auxiliary
9168	Weight Enforcement
9200	Unknown
9232	Communications
9264	Traffic Services
9296	Maintenance

DOTD District 8

District 8 includes Avoyelles, Grant, Natchitoches, Rapides, Sabine, Vernon, and Winn parishes. This district includes the metropolitan Alexandria area.

Talkgroup	Description
9328	Main
9360	Auxiliary
9392	Weight Enforcement
9424	Unknown
9456	Communications
9488	Traffic Services
9520	Maintenance

DOTD District 58

We did not forget forty-nine DOTD districts. The numbers simply jump. District 58 includes Caldwell, Catahoula, Concordia, Franklin, LaSalle, Madison, and Tensas parishes.

Talkgroup	Description
10000	Main
10032	Auxiliary
10064	Weight Enforcement
10096	Unknown
10128	Communications
10160	Traffic Services
10192	Maintenance

DOTD District 61

District 61 includes Ascension, Assumption, East Baton Rouge, East Feliciana, Iberville, Point Coupe, St. James, West Baton Rouge, and West Feliciana parishes. This district includes the metropolitan Baton Rouge area.

Talkgroup	Description
8208	Main
8240	Auxiliary
8272	Weight Enforcement
8304	Marine Operations
8336	Communications
8368	Traffic Services
8400	Maintenance



DOTD District 62

District 62 includes Livingston, St. Helena, St. Tammany, Tangipahoa, and Washington parishes.

Talkgroup	Description
8432	Main
8464	Auxiliary
8496	Weight Enforcement
8528	Unknown
8560	Communications
8592	Traffic Services
8624	Maintenance

Local Agencies

Some sheriff's offices and police departments have talkgroups on the state system.

Talkgroup	Description
49168	Ascension Parish Sheriff's Office - Dispatch
49200	Ascension Parish Sheriff's Office - Juvenile
49232	Ascension Parish Sheriff's Office
49264	Ascension Parish Sheriff's Office - HQ
49296	Ascension Parish Sheriff's Office - TAC
49328	Gonzales PD - Dispatch
49648	Beauregard Parish Sheriff's Office - F1
49776	Beauregard Parish Sheriff's Office - F2
49584	Cameron Parish Sheriff's Office
41424	Causeway Police F-1/East Jefferson Levee PD
41456	Causeway Police F-2
33072	Golden Meadow PD
49424	Lafourche Parish Sheriff's Office F-1
49456	Lafourche Parish Sheriff's Office F-2
49488	Lafourche Parish Sheriff's Office F-3
49520	Lafourche Parish Sheriff's Office F-4
49360	Lafourche Parish Sheriff's Office F-5
49392	Lafourche Parish Sheriff's Office F-6
34000	Lafourche Parish Sheriff's Office
33328	Lafourche Parish Sheriff's Office - Supervisors
33136	Plaquemines Parish Sheriff's Office

American Red Cross

The people of Louisiana are a resilient bunch. Hurricanes in the Gulf of Mexico often find their way to the shores of the Bayou State. The Mississippi River is prone to flooding and much of New Orleans lies below sea level. Thankfully, the American Red Cross is always ready to respond to disasters and they have a number of talkgroups on the system.

Talkgroup	Description
33584	Baton Rouge
33616	New Orleans
33648	Houma
33680	Lake Charles
33712	Alexandria
33744	Monroe
33776	Shreveport
33808	Lafayette
33840	Covington

Louisiana National Guard

The American Red Cross is not the only agency that gets involved when Louisiana needs help. Civil defense responsibilities fall on the Louisiana Office of Homeland Security and Emergency Preparedness, a department of the National Guard. Since this office works in conjunction with the State Police, they are organized along the same lines as the LSP.

Talkgroup Description

20528	Administration - Troop A
20560	Operations - Troop A
20592	Secondary - Troop A
20656	Administration - Troop B
20688	Operations - Troop B
20720	Secondary - Troop B
20784	Administration - Troop C
20816	Operations - Troop C
20848	Secondary - Troop C
20912	Administration - Troop D
20944	Operations - Troop D
20976	Secondary - Troop D
21040	Administration - Troop E
21072	Operations - Troop E
21104	Secondary - Troop E
21168	Administration - Troop F
21200	Operations - Troop F
21232	Secondary - Troop F
21296	Administration - Troop G
21328	Operations - Troop G
21360	Secondary - Troop G
21424	Administration - Troop I
21456	Operations - Troop I
21488	Secondary - Troop I
21552	Administration - Troop L
21584	Operations - Troop L
21616	Secondary - Troop L
21648	Civil Support Team

Federal Government

The Mississippi River is vital to our nation's security and economy. Drivers across the country learned this in February 2004 when a supply ship collided with a container ship at the entrance of the river. This closed the river to all ocean-going vessels, which meant oil tankers from the Gulf of Mexico could not offload their cargo, immediately driving up petroleum prices.

The United States Coast Guard (USCG), United States Customs Service (USCS), and the FBI all work to keep river traffic flowing smoothly and protect our nation against unwanted visitors.

Talkgroup	Description
6544	USCS
6960	USCG Marine Safety Services
7024	USCG Marine Safety Services
32944	Military Operations
34640	USCG Marine Safety - Morgan City
34832	FBI Task Force
34960	USCG Marine Safety Office - Spill Response

Conclusion

The unofficial motto of Louisiana is "*Laissez les bons temps rouler*" meaning "Let the good times roll." There's plenty to see and do in the Bayou State. From the night life of New Orleans' French Quarter to the quiet quarters in the bayou, Louisiana has something for almost everyone. Bring your appetite for beignets and etouffée and remember to pack your scanner!

Narrowbanding and Your Scanner

By David T Stark

"My scanner can't display all those digits. Will I still be able to hear the conversations?" "Should I buy a new scanner now or wait until a narrowband scanner comes out?" "My scanner already has FM-Narrow mode, so what's the big deal?"

Questions like these are being asked more and more often as agencies around the United States begin using newly authorized "narrow-band" or "splinter" frequencies, especially in the VHF-High (150-174 MHz) range. So far, activation of these channels has been sporadic, although the pace is increasing. (For the new band plans, go to <http://www.monitoringtimes.com>, Radio Reference Library. "VHF/UHF Frequency Allocations" provides an overview and more specific breakdowns are also available by service.)

In many ways, current scanner hobbyist concern over "narrowbanding" is reminiscent of several earlier advances in radio technology. Back in the 1970s, the opening of the UHF band (450-470 MHz) made VHF-only scanners obsolete in some parts of the country. Further expansion into the television or "T-band" (470-512 MHz) sent more scanner listeners back to the radio store.

More recently, many of us have had to upgrade our scanners in response to 800 MHz allocations, trunking, and digital voice radio. Scanner technology usually lags behind technological advances in commercial radio, but it eventually catches up in a fairly short time.

In other ways, however, the change to "narrowband" emissions on VHF and UHF is going to affect the scanner hobby more generally than did the above advances. Before exploring these differences, we need to understand what "narrowband" means in this context and why two-way radio users (and scanner listeners) will have to upgrade their equipment again.

As you probably know, the Federal Communications Commission (FCC) is the American government agency that regulates non-federal radio usage and technology. One of the FCC's responsibilities is to make sure that entities that use radio communications have access to sufficient radio spectrum – enough frequencies – to meet their needs. The amount of radio spectrum available for the FCC to issue new licenses to use is limited by physics, population, international treaties, and technology.

Physics

Radio frequency spectrum is a limited resource. You might have heard the expression "DC to daylight" as a description of radios that can operate over the widest possible range of frequencies. In actual fact, while the electromagnetic spectrum does cover that entire range, the portion of it that we use for radio is relatively small. It has lower and upper limits, and once all of the possible frequencies between those limits are in use, there will be no more available. Also, any modulated signal occupies a range of frequencies, represented by a measurement called "bandwidth."

The FCC cannot alter the laws of physics.

Population

Major metropolitan areas contain many potential users of, and uses for, radio frequencies. Some large population centers are concentrated into relatively small land areas, while others sprawl over considerable distances. But, within any of these metro areas, a signal on any given frequency probably can be received over the entire area. Any other transmitters using that same frequency would cause interference, which can render all of the signals useless.

The FCC cannot control population density.

International Treaties

Near international borders, radio frequency availability is subject to agreements between the respective national governments as to how they will share the radio spectrum and minimize interference between users on either side of the border. When a major metropolitan area develops in a border area, the needs of the population for multiple frequencies can collide with the FCC's obligation to see that frequencies in the United States are licensed according to the terms of any relevant treaties.

The FCC has little, if any, influence over international treaties and simply must abide by them.

Technology

In order to ensure that radio users can obtain radios from various manufacturers that can be used together, the FCC imposes technical stan-

Afraid you'll be missing out on the action on new split frequencies? Worry no longer! Here's how it works, plus a few tips to improve your reception. (Photos by Garry W. Watts)



dards onto the way radio signals can be generated. Because the various methods that exist to produce a radio signal create signals with different characteristics, the FCC must regulate such things as mode (like AM, FM, and others) and bandwidth (how many frequencies a signal that is carrying information may occupy). A transmission technology that can carry as much information as another while using fewer frequencies to do so is more spectrum efficient. If adjacent signals overlap each other too much, they interfere with each other. For any given level of spectrum efficiency available, the FCC can authorize the use of a particular number of frequencies, but no more.

The FCC can affect the technological capabilities of radio equipment by changing its regulations to require, for example, more spectrum efficiency.

Previous Solutions to Frequency Shortages

Radio frequencies were originally allocated in groups, bands, or "blocks" according to their intended uses. If an entire block of frequencies that had been set aside for a certain purpose (such as police radio) got used up, then the FCC could solve the problem by reallocating frequencies from a different block. This happens in the largest metro areas where two-way communications can be found on frequencies that are allocated for television broadcasting everywhere else, or where land mobile signals are authorized on marine channels in areas that have no nearby navigable waterways.

As mentioned earlier, this solution has one unbreakable limitation. There is still only so much radio spectrum to go around. Eventually, there would be no more unused blocks to reallocate. What is needed is a way to squeeze more radio signals into the available spectrum. If you've stuck with us this far, you probably can anticipate the solution.

The New Solution

You guessed it! Tightening the technical standards to force radios to be manufactured that can carry voice and other traffic on a narrower slice of the spectrum than is used currently, or with greater spectrum efficiency, would have the effect of making room for more signals. That is exactly what the FCC has done.

In its Third Memorandum Opinion and Order under W.T. Docket No. 99-87 (FCC 04-292), the FCC has mandated that all two-way radio equipment used on VHF and UHF by public safety or businesses must be using "narrowband" technology by January 1, 2013.

How Narrow is "Narrowband"?

The FCC does not use the same terminology to describe radio emission modes as the scanner manufacturers do. The Commission uses the terms Ultrawideband, Wideband, and Narrowband to describe voice or data emissions in what we know as the scanner bands. What scanner listeners know as "narrowband" on current scanners is the FCC's wideband. For example, such signals (in the UHF band) are authorized to occupy a bandwidth of 25 kHz, or 12.5 kHz on either side of the center

frequency (which is where we tune our scanners). The new FCC narrowband specification allows signals that are 12.5 kHz wide, or 6.25 kHz on either side of center.

Because the signals are half as wide, channel centers can be half as far apart, creating twice the number of channels. The current VHF high band (150-174 MHz) uses 15-kHz channel spacing, so that we tune to frequencies like 154.160, 154.175, and 154.190, for example. Narrowbanding will create channels at 7.5-kHz intervals on VHF, or 154.160, **154.1675**, 154.175, **154.1825**, 154.190, etc.

The same bandwidth standards will apply on UHF (421-512 MHz) as well, but the old and new channel spacings are different from VHF. Current UHF spacing is 12.5 kHz, as in 460.000, 460.0125, 460.025, 460.0375, and 460.050, for example. The new interval will be 6.25 kHz, so the same amount of spectrum will have channels centered at 460.000, **460.00625**, 460.0125, **460.01875**, 460.025, **460.03125**, 460.0375, **460.04375**, and 460.050, etc.

We describe these frequency changes and channel additions in the future tense, because the deadline for full compliance is in the future, but the new in-between frequencies have already been authorized and some narrowband radios are already in use.

Where Will Narrowbanding Apply?

Everywhere in the United States! Unlike previous changes in radio allocations that only affected people in densely populated areas where frequency spectrum was already running short, the FCC's mandate for narrowbanding applies to every radio user on VHF and UHF regardless of where they are in the country.

The FCC is also working on high-efficiency standards for existing 800 MHz allocations, and for the upcoming 700 MHz bands. The Commission is also cooperating with efforts to establish possible separate narrowbanding requirements for certain frequencies used by federal agencies that are not licensed by the FCC.

Is My Scanner Obsolete?

You might not need to rush out and shop for a narrowband-capable scanner right away, or you could already be experiencing the effects of narrowbanding in your listening area. A scanner that will be able to handle narrowband signals as well as wideband transmissions needs to have two specific features:

- The ability to tune in 7.5-kHz intervals on VHF and 6.25-kHz intervals on UHF.
- Receiver filtering that will allow only the desired narrow signal to be heard.

There are very few scanning receivers on the market right now that have the first feature. Some of them are amateur transceivers with wide coverage receivers. In some units, such as the Radio Shack HTX-420 (now discontinued), the 7.5 kHz tuning is not accurate outside the two meter ham band.

To this author's knowledge, there are no existing scanners that operate in true narrowband mode, regardless of how closely they can tune the frequencies. There are high-end communications

receivers that have the necessary filtering available, but no scanners yet. (Corrections to this assertion would be accepted gladly.)

Don't panic, though: You can still listen to these new narrowband signals on your existing scanners. The narrowband signals will simply sound about half as good as wideband signals. This is because your scanner lacks the two necessary features mentioned previously.

Without the ability to tune the exact center frequency, your scanner will be off to one side or the other, so some signal quality can be lost. The lack of narrow filtering is a two-edged sword. On the one hand, it allows you to hear the off-channel narrowband signal rather than screening it out. On the other hand, your wider-than-needed receiver bandwidth allows other signals and interference to "ride along" with the narrowband signal, making that particular signal sound weak and perhaps muffled.

Depending upon the tuning steps available in your scanner, you might be able to minimize interference from stronger (and wider) adjacent signals by creative tuning. For example, suppose you want to monitor a narrowband signal on 154.1675 MHz. Many scanners can tune the VHF band in 5-kHz steps, so you have a choice of 154.165 or 154.170 as the closest frequencies to the target that your scanner can tune. Neither frequency will be "better" because they are each off frequency by the same amount. But, if there is another signal on a nearby wide channel, you can improve your reception of the narrow signal by tuning away from the wide signal.

In other words, if the interfering signal is on 154.160 MHz, then you should get clearer reception on the narrowband frequency by tuning to 154.170, because it is farther away from 154.160. On the other hand, if the interference is coming from 154.175, then your best choice would be to tune 154.165 MHz.

If your desired narrowband target is stuck between two active wideband channels, then you could "tune away" from the busier one. It might be necessary to use the attenuator if your scanner has one, or even to remove the antenna if it's a portable scanner.

New narrowband systems are coming on line all the time, so keep your eyes peeled for news online and in *Monitoring Times*, keep checking for activity on the new splits in your area, and report what you hear so others can join in. And remember, narrowband doesn't have to make your equipment obsolete – it just doubles the number of frequencies you can tune in!

Try This!

Even if there are no narrowband signals in your area yet, you can get an idea of what they would sound like if you have a scanner with a "wide" FM mode. Just tune to an active VHF or UHF channel and put your scanner into the wide mode. Use a signal that is not received at full strength for the best demonstration. The signal will sound weaker and noisier. That is approximately what a narrowband signal will sound like (perhaps worse if you have to tune off-frequency) on your scanner in the "narrow" FM mode.

Birth of a Station

By Todd Van Gelder

AM – The Universal Standard

In an age when the radio industry is forever pushing new technologies (Satellite, the next big thing! Digital radio, the next big thing!), it's nice to know that good old analog AM radio is the "big thing" in the world of motorist and security information. As a Senior Systems Analyst under contract to the National Institutes of Health (NIH) in Bethesda, Maryland, I have seen tremendous changes over the last three years. Indeed, just after arriving at home from work one night last fall, I remarked to my 6 year old son (who is often fascinated by such observations) that in 1 week, a 250 car, 5 story parking garage had sprung up where there was a 30 car lot the week before!

Although I may have cut the construction time by a few days for dramatic effect, new buildings and facilities at the main NIH campus have been going up at a remarkable rate. Although it has become somewhat cliché to cite how the country has changed post 9/11, everywhere you look at NIH, post 9/11 change is evident. NIH's primary mission is to prevent, detect, diagnose, and treat disease and disability, yet a goal that has risen to the top of the priority list has been to fight the threats posed by bioterrorism. Current facilities just don't provide enough room.

Keeping the Community Informed

Construction projects and special events are nothing new at NIH. However, with the recent rapid expansion, one of the major challenges faced by Thomas Hayden, NIH's Director, Division of Travel and Transportation Services, has been keeping staff, visitors, and patients informed about ever changing traffic patterns on campus.

In order to meet this challenge, several years ago Mr. Hayden proposed the installation of a Travelers Information Station (TIS). These stations are also sometimes referred to as HARS (Highway Advisory Radio Systems). However, the proposed radio station didn't become a reality until post 9/11 funding became available.

After researching TIS service providers and following the government procurement process, Mr. Hayden and his staff settled on Highway Information Systems Inc. (HIS) of Durham, N.C. HIS not only sells complete AM transmission systems to the TIS market, it also handled the complex licensing process for NIH. Licensing

of a TIS for a federal agency involves not only obtaining an FCC license, but an additional application process via the National Telecommunications and Information Administration (NTIA). The NTIA oversees frequency usage by the federal government.

Finding a Frequency

As I sat at a traffic light waiting to turn into one of the main NIH entrances in the fall of 2003, I noted a large, automated message sign telling me to "Tune to 1610 AM for NIH traffic information." I was intrigued. So I tuned in and heard warnings of impending road closures and information about upcoming events. I began to use this new resource frequently, until one day the station seemingly disappeared. Had this station been only temporary, I wondered? Perhaps a project whose plug was pulled? It was nothing of the sort. The station was simply told to move up the dial a little.

Once the system was purchased and installed, NIH was initially given permission to operate on 1610 AM. A temporary license was issued in the late summer of 2003 and the call letters KFQ-70 were assigned. Typically, these licenses expire after 6 months, but the originally assigned frequency usually stays the same once the permanent license is assigned. However, with a 1kW Spanish radio station WLXE-1600 AM, Rockville, MD, just 10 kHz and 6 miles away, there were interference problems for both stations. So, when the final license was issued, the unused frequency of 1660 AM was assigned.

AM Radio, the Core of the System

The HIS system installed at NIH includes a digital recorder/player, a remote recording and control system (which can be accessed via telephone), integrated variable message signs and flashing beacons for traffic control. At the heart of the system is a 10 watt AM transmitter which feeds a precisely tuned transmitting antenna which tops out at 49 feet above the ground. The antenna uses a triad based grounding system. All the devices are controlled by PC based software.

The fact that the antenna tip sits 49 feet above ground is not random. The FCC limits TIS antennas to a maximum height of 15.0 meters (49.2 feet). However, the actual antenna length is determined by the frequency of the transmitter. After installation, the antenna was mechanically tuned for the best performance possible. In short,



The self contained 10 watt AM radio station KFQ-70 has a typical range of 4-6 miles. Tower height is 49 feet. Photo, courtesy NIH.

every step was taken so NIH could get maximum distance out of a system with both power and antenna height restrictions.

Typical transmission distance during daylight hours is estimated at around four miles. However, I have received the station over seven miles from the transmitter. As night falls and propagation kicks in, reception of KFQ-70 typically goes one of two ways: if I'm close to home, which is beyond 4 miles, it gets crushed by skip from what I presume is 1660-WWRU, Elizabeth, NJ, a Spanish station; otherwise, it has the frequency to itself and can be heard until I'm well north of Baltimore (over 100 miles away!). Given the roller coaster ride of solar activity recently, reception is anything but predictable.

Success, DX and the future of TIS

Mr. Hayden is extremely happy with the way the system has worked so far. In fact, this installation has been used as a demonstration site for other interested government agencies. It looks like TIS has a promising future on the AM dial. Travelers Information Stations seem to be a DX target, too. I have seen numerous mentions of TIS loggings in *MT* in the past year. Craig Krist even mentioned hearing the NIH outlet in loggings submitted to *MT* in April of 2004.

To those industry folks forecasting the demise of AM radio, don't tell the thankful motorists out there who rely on TIS outlets to get them to work each day or the DXers who log these new low power targets. An AM radio in a car is a universal feature that still gets us the information we need and there are no subscription fees.

Hello from Alfa Lima International

By Alfred E. Zoer

Welcome to the first lines from me, Alfred Zoer, in *Monitoring Times*. A few of you might know me from the free radio station Alfa Lima International (<http://www.alfalima.net>).

As I'm bigtime involved in the free radio scene on medium and shortwave, I thought readers might enjoy an occasional piece about the wonderful world of free radio on short and medium wave. Many of you know already that there are pirates active on shortwave and that you can often find the European stations between 6.200 and 6.300 MHz AM and, in the USA, in the area of 6.955 MHz in USB.

You will find unlicensed broadcasters in very different programming and powers. For example, we see that pirate stations in the United Kingdom often have a very professional sounding program with low power that varies from 5 to 50 watts, running tapes from secret locations. The Dutch and German pirates often transmit from their own homes with powers that go up sometimes to 5 or 6 thousand watts, with programming that usually contains lots of music with announcements only now and then. When we take a look at pirates in the USA, we often hear stations that have political reasons to launch their transmissions or who mostly run comedy programming.

What many of you might not know is that some stations use higher frequencies to reach listeners in other continents and that they are often very successful in doing so. Our station is often on 15.070 MHz AM, but a number of stations also use 15.800, plus or minus 25 kHz, and have achieved some remarkable distances with good reports, even though they are often transmitting with very low power.

Of course, there are more high frequencies that are used. A few pirates from

the Netherlands are sometimes testing on 13.865 and lately there have been some tests on 17.465 and 17.470 by the Dutch stations Black Arrow and Space Shuttle International. Also don't forget the 21.900 MHz area (+/- 25 kHz).

There are a number of other frequencies that pirates use we have not mentioned, but the point is, you can never really be sure where pirates will pop up as they are operating outside the rules. You never can pinpoint them to a time or a few specific frequencies. Trying to listen to pirate stations on shortwave can be a real sport, especially if you try to catch them from other continents – the powers are low, you are never really sure when they are transmitting, and on top of it all, you often need good conditions. So, trying to listen to pirate stations can bring an extra dimension to shortwave listening.

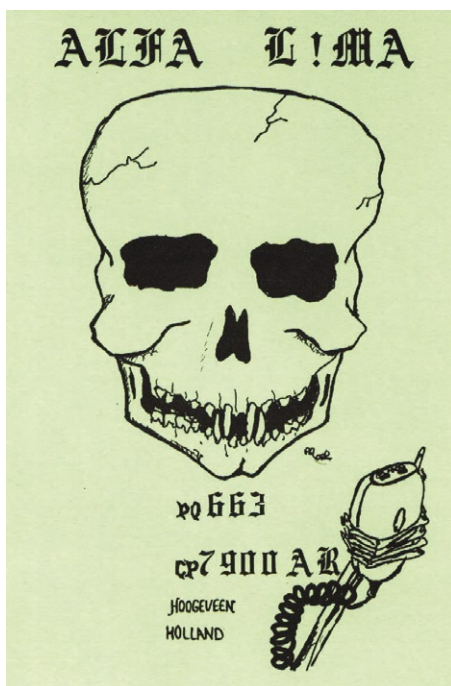


There is a nice yahoo group about shortwave pirates that gives recently-heard frequencies and tentative schedules, which might be of interest if you would like to try your hand at catching pirate stations. The URL of the group is <http://groups.yahoo.com/group/SWpirates>. Joining this group should give you a nice start in catching them. Or, just use keywords like "short wave pirates" in a search engine like Google to find more about this aspect of shortwave listening.

All that is left for me to say in this edition: "Happy pirate catching."



The Alfa Lima International studio



Courtesy blackcatsystems.com



Alfa Lima's Rhode & Schwarz transmitters

On Writing Club Newsletters

By Arthur R. Lee WF6P

My wife Donna, AB6XJ, was in bed with the flu and not hungry. She suggested that I go to our favorite cafe for dinner. "Take along some magazines and catch up on your reading," she said. That sounded good. For some light reading I gathered up a copy of *Aviation Week*, *QST*, and the February 2004 issue of *Monitoring Times*.

My monthly column for our ham radio club newsletter was due, so I took along a note pad in case I came across something of interest. I only had to go as far as the first few pages of *Monitoring Times* to find "May The Law Be With You" by Jorge Rodriguez. He discussed a ham's misadventures with the law. It had to do with ham gear mounted in an automobile in New York state. For those of us who have or intend to operate mobile, it was an eye-opener.

Then, on page 22, *MT* editor Rachel Baughn, KE4OPD, wrote "Save Your Local Airport!" about air-to-ground communications and navigational aids for general aviation pilots. My on-the-air friend Carrie Jenkins, KI6QO, owns her own Cessna 152, so she will be interested. A couple of our club members are also pilots.

I've been writing my "Chatter" column for over a decade and enjoy doing it. Our club has a membership of over a hundred and I know most of them by their call sign, name or on sight. I am familiar with some of their hobbies outside of ham radio: stamp collecting, history, genealogy, old farm machinery, etc., so I can crank out stories relating to those topics if necessary. My rule is to always link the stories to ham radio, even if the connection is a rather long stretch. I carry a little notebook to our club activities such as meetings, Field Days, ARES training and parties. Usually there is some little joke or incident I can write about. We have fun, and our guest speakers are always good for a paragraph or two of write-up.

In by the Back Door

I began my newsletter writing sort of by default. Our club

president asked me to write a short note about some ham happening, which I did. At first I only wrote a few paragraphs and managed to include something about a club member or two I had seen or worked with, either on the air or in person. Then, to fill my column, I included details of some of the interesting QSOs I had during the month or what amazing thing happened to me "on the way to the forum."

I specialize in Maritime Mobile nets, so there are ample sea stories to relate. As our Santa Cruz amateur radio club is located in the coastal town of its name, many of our members set out on their boats for lands far beyond the salty horizon. Prior to a big winter storm blowing the elements off my tri-bander beam, I kept in touch. This gave me plenty of material for what had by then become my monthly column. We were all interested in the strange lands our club members were visiting. In the 1980s

before email and GPS, life away from home and at sea was fraught with danger at times. Snail mail from a boat in the Indian Ocean was, shall we say, rare or even non-existent.

Making the Commitment

So what does a prospective newsletter columnist have to face? Well, for starters, a monthly deadline date has to be met if the editor is depending upon you to fill his "white space." This really isn't hard to do if you mark your calendar well in advance. The next step is the gathering of material. One of my CW pals, Marsha Messer, AB7RJ, lives in the state of Washington. She said she wouldn't want to do it "because a writer has to go around all the time, thinking of things to write!" She's right, of course, but I find that to be the fun part.

In my column, I like to mention names of club members and their activities. If I see

a member in a coffee shop, out sailing, or in the medical clinic, it rates a line or two, maybe more. Everyone, it seems, likes to be written about. I did have one club member who asked me not to put it in the newsletter that she was pregnant. I don't know why. We were happy for her when she delivered a bouncing baby girl.

I always try to keep things on the light side. But there is always the inevitable passing away of a club member that cannot go unmentioned. A short write-up is all that is needed for a Silent Key (SK). Many of our club members have moved out of town but still receive their newsletters and want to keep up with the status of old friends. As with lifetime friendships, visiting a relocated ham in his new QTH is rewarding. One of my favorite topics is: Where Are They Now? Under this heading, out of town members get top billing.

A good source of information is our Monday night two-meter club net. Our members check in, offer their QSTs, and club officers give their reports. This is followed by an "open mike" session where everyone is invited to give a "15 second sound byte." (It's a good thing

CLUB QRP PROJECT?
We have several new and young members and I suggest that it would be a "learning through" experience.
How about it?
Visit the SCCARC Website at: www.k6bj.org

FEBRUARY 2004
THE MONTHLY NEWSLETTER of the SANTA CRUZ COUNTY AMATEUR RADIO CLUB
SHORT SKIP

Hams Helped Hazarded Hermits
by AA6ZG, Leon Fletcher
Last fall, while strolling the sands of Oregon's beautiful Cannon Beach, I wondered about how life might have been on that remote, rugged, remarkable monolith about a mile from the shore. He made series fixed condensers of foil and wax paper that had been salvaged from a piece of spring brass.

RadioFest 2004
with!!
It has

By Art Lee WF6P
CHATTER
Our club meetings are off to a good start for 2004. We had a nice gathering with several new faces. One of these was Bosco Boscarelli, W5TQP, who joined the club. His XYL, Dani, worked with me for many years at Cabrillo College. Bosco and I worked on the same type of airplanes: the 1567 F8 and F4 fighters at NAS Miramar and MCAS Yuma, Arizona, in the 1960s. Bosco and Dani have been married 10 years. Congrats to you both and welcome aboard!

MONTHLY MEETING:
The SCCARC Meets at 7:30 FRIDAY of the each month. Meetings are at Dominica Hospice, Santa Cruz.

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MONTEREY BAY ACTIVITY
SCCARC Repeaters: K8BH 146.790 PL 94.8 Santa Cruz (linked w/Watsonville full time)
K8BH 147.345 PL 94.8 Watsonville (linked w/Santa Cruz full time)
K8BH 440.925 PL 123.0 Santa Cruz
• SCCARC Net Monday 7:30 PM 146.79 / 147.945 / 440.925+ link
• SCCARC 10 Meter Net 28.300 PM 146.79 / 147.945 / 440.925+ link
• SCARES Net Monday 8:30 PM 146.835 (PL 94.8)
WVRAOK 147.120 PL 94.8 Ben Lomond
• SLVARC Net Thursday 7:30 PM
N6TVA 146.745 PL 94.8 Felton
• SLVARC Net Thursday 7:30 PM
Rich Wadsworth 7:30 PM
K6LY 146.97 PL 94.8 / 444.700+ PL 123 (linked) Monterey
• Monterey ARES Net Wednesday 7:30 PM
• NPSARC Net Wednesday 8:00 PM
• Headline (Mon News) Broadcast Wednesday 8:30 PM
52.8 MHz (PL-114.8) Sunday 8:00 PM
6 Meter Local Net
Mont. Bay Chapter 191 QCW: Tuesday 7:30 PM, N56G repeater, 146.700 PL 151.4
FOR MORE INFO SEE: <http://www.k6bj.org/freq.html>

County-wide ARES net goes live
Our first county-wide ARES voice net Wednesday evening had 27 amateur radio operators checking in. "I hope we all find

SCCARC Calendar of
SCCARC Board Meeting
SCCARC Meeting
Short Skip Deadline
SCCARC Meeting

AMATEUR RADIO
EMERGENCY SERVICE

Member Profile WF6P



My day began with a visit to Frank K6BDK who was donating some coax for the AO-40 project and he was excited to tell me he had worked ZS on 40 meters the night before using PSK-31. He said times and technology change but the magic of communicating via radio is what our hobby is all about.

Speaking of communications my next stop was to meet Art Lee WF6P at his favorite donut-coffee shop. Art might best be described as a multi-tasking communicator. We are all familiar with his regular "Chatter" articles in Short Skip but he is also a prolific writer for a wide

variety of magazines. One such magazine called "Monitoring Times mirrors Arts very first exposure to Short Wave Listening. That first exciting demo in 1945 of a Hallicrafter S20 R tuned to a South American BC station lead to half a lifetime love of Ham Radio in the wider context.

we have a limit! Hams love to talk.) I usually jot down a few notes for the column.

Lastly, we have kept up with technology and have a club website (<http://www.k6bj.org>). On the K6BJ website "Reflector," club

members can post messages about equipment problems, ask questions of a technical nature, list items for sale, add reminders of meetings — and yes, even the deadline dates for the newsletter.

Giving Back is also Fun

As my old friend and mentor Leon Fletcher, AA6ZG, a frequent contributor to *Monitoring Times* says, "There is so much to write about!" He's right, and so is Marsha. But once into the newsletter writing habit, it is fun.

Pay for a club newsletter contributor or editor is very high — in recognition, at least. It can even result in a pat on the back at the annual Christmas party! We are fortunate to have an excellent editor. Ron Baldwin, K6EXT, has been putting out the newsletter for several years. What started out a couple of decades ago as a simple monthly postcard mailed to members, graduated to a single typewritten page (written, published and mailed by the club president). It has now evolved into a 5 or 6 page newsletter filled with club news featuring photos, sidebars and individual contributions. The introduction of digital photography made photo work easy.

If your ham club has a newsletter, contact the editor about submissions or just send him or her your material. I'm sure that they will welcome your help. If you don't consider your writing as "professional" don't worry about it. After all, we are amateurs! Just write like you talk (Hello, Wayne Green!). Think of it as a letter to your friends. Club members will not complain if you are not a Pulitzer Prize winning novelist. Who knows, if you keep at it long enough, it might come your way! Hi! Hi!

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Out-of-the-Box Success for Digital Beginners

It's not every day I get ham radio operating advice from a 7 year old, but that's just what I got last year from young Mattie Clausen AE7MC, when I asked her what her favorite operating mode was. The Amateur Extra Class ham (who received her Tech Class ticket at the ripe old age of 5) said, "You've gotta try PSK31. It's great!"

I'd read about the mode, but since I didn't have the necessary interface, software, and wasn't even sure my old Kenwood TS-140 was modern enough to work that mode without modifications, I passed on the suggestion. A few months later I was chatting with *MT* Assistant Editor Larry Van Horn and he was talking excitedly about PSK31. "It's great," he raved, "With hardly any signal at all you can work a station from around the world and on low power!" It was starting to sink in.

The final straw came towards the end of 2004 as the HF bands scraped along at the bottom of the solar cycle at depths even pessimists couldn't have foretold. The words of young Mattie and Ol' Larry echoed in my mind as I pondered a move to the digital side of amateur radio.

❖ The Simple Signalink SL-1+

There are many sound card interfaces on the market. There are even plans for homebrewing your own. My previous foray into the digital world was several years ago when I used the Tigertronics' BayPac modem for DOS-based monitoring SSTV, WEFAX, etc. And, when I went to their web site (<http://www.tigertronics.com>) I noticed they had a new product out which looked interesting.

The Signalink Model SL-1+ is a very small, ruggedly built, sound card radio

interface which was so shamefully easy to configure and connected so quickly to both the rig and my computer that I was a little chagrined. The unit came with a mini-CD packed with various software programs for many of the most popular modes: BPSK31, SSTV (Slow Scan TV), RTTY, CW and others. In the CD you'll also find a 14 page installation and operating manual which can be printed and kept for reference while you're learning to use the Signalink and operate the digital modes.

The first concern is how to configure the unit for your particular transceiver.

Tigertronics has simplified their own production costs by passing on the configuration to the end user. Using a handy chart and a number of provided "jumper" wires, the correct arrangement for Kenwood, Yeasu, and Icom transceivers is easily set up. You do need to be careful setting the jumper wires, as it is possible to break them if you're not paying attention. If a wire breaks off in the connector, you'll have to send the unit back at your own expense to have it repaired. Once done, however, you shouldn't have to do this procedure again unless you change transceivers.

The second concern is how to power the unit. In some cases the power from your radio's auxiliary jack will have the required 12 volts. Mine didn't, but I found a universal wall transformer from Radio Shack that worked fine. While the unit can be plugged into your mike jack, you'll find it more useful to use the AUX jack. This means you don't have to plug and unplug the mike as you switch from digital to SSB.

If you're going to use Signalink only for monitoring you don't need any auxiliary power, because the Signalink's receiver circuitry is active all the time. Even if you do have the unit powered, it will not transmit until the power button is pushed and the green power LED lights.

❖ It's All in the Software

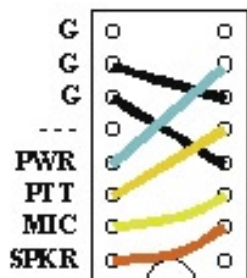
None of this works without the various software programs which are widely available. I started out with HamScope 1.54, which was on the Signalink CD. It's free-ware and runs on Windows 9x, ME, 2000 and XP. There is a much better software package, known as MixW, which supports many more modes and has other features for serious users. But, for the MixW there is a two week demonstration period after which you're asked to register the product for \$50.

I started using the HamScope software and found it was easy to use from the very beginning and serves the novice digital operator quite nicely. It's a cheap (free!), painless introduction to the digital modes. There may come a time when you'll want something with more capabilities, particularly if you do contesting or use an electronic log book. MixW is very useful for this purpose and I found it to be the most popular software in use by digital enthusiasts I met on-air. DigiPan, another software package, is also popular on the bands and it, too, is on the CD ROM.

Loading the software is as easy as popping the disk into the CD reader and following the simple prompts. In the case of HamScope, you will also have to have a packet engine and a RTTY engine to work those modes. I downloaded the MMTTY program written by JE3HHT, Mako, from <http://mmhamsoft.ham-radio.ch/>. I found that for PSK and RTTY modes, HamScope did everything I needed it to do right from the start.

There may be updated versions of the software available at the home web sites of the software designers, so take a trip to their web sites and see. There will also be links to various related sites such as support groups and chat rooms which you might find helpful in ironing out any difficulties you encounter. There is a troubleshooting section to the Signalink manual you should consult first. Here you'll find detailed tips on what to do when things just aren't working.

Whichever software you use, you'll find more and more useful features the more you



Beginner's Hits and Errors

It's easy to get started in the digital modes and it's just as easy to make on-air blunders. Here are a few tips to try to avoid looking too much like a beginner when you begin:

- Make sure you have turned off your speech processor or other mike compression adjustments, turned down the mike gain and turned off your VOX circuit before transmitting. Transmit/receive functions, including PTT delay, are handled by the Signalink. Since you're using Audio Frequency Shift Keying (AFSK), make sure the audio sounds on your computer are turned off, because they could end up in your transmission.
- Spend some time monitoring all the digital frequencies before you start transmitting. Get to know the protocol used by DX and domestic operators.
- Know what frequencies your license allows you to operate. Know if a station is operating "split" and follow the directions (transmitting on 14.070 and listening on 14.071, for instance).
- Pay attention to your screen settings and your rig settings. Going back and forth between side band and digital modes, simplex and split operations things can really get confusing. Before transmitting check to see that all your settings are correct.
- Make sure the correct call sign is in the "call" box and that you hit the right macro buttons when you want to. It's almost too easy to look like a complete idiot in the digital mode.

use it. Most have digital signal processing which allows you to operate under some extreme QRM (man-made interference). This was a big plus during some contacts.

❖ Getting on the Air

Having installed the HamScope software, set the jumper wires in the Signalink, and made the necessary connections between the transceiver and the computer, I was ready to start looking for digital signals. The various digital modes are allowed on all HF bands (except 50 meters) in special sections. You have to know what the operating limits are before you can start transmitting. Below

is a chart of basic frequencies and a few tips on basic digital operations.

Most operators reduce their output power to 50 watts or lower. It's not uncommon to make contacts with stations running as low as 10 watts. The two main reasons for this are that at the full 100 watts your signal may be too broad and take up too much room in the band pass and, unlike CW (Morse code) or SSB (Single Side Band), the transmitter runs the whole time it's keyed, putting a lot of stress on your rig's final transmitting transistors.

At about 1430 Z I was tuning around 21.070, the PSK31 frequency on the 15 meter band. Watching the spectrum portion of the HamScope 1.54 screen on my monitor I saw a small spike in the display. I looked at the signal meter on the transceiver and it was not moving. It lay quietly all the way to the left of the meter not even flickering. I was very dubious.

I left clicked with the mouse with the cursor over the spike and instantly, in the received message portion of the display appeared "...CQ CQ CQ de SV8UM..." repeated several times. "Well," I thought, "Greece! But, there's no way he's going to hear my signal." I typed his call sign into the little window labeled "call" and, having already put my own call sign in the software setup, clicked on the "TX" button on the screen and then the "Call" button. The red PTT (Push-to-Talk) LED on the Signalink lit immediately and the rig sprung to life, sending his call followed by mine given twice. In seconds, the spike reappeared and SV8UM came back with my call and a signal report. I was totally amazed. On a signal strength which wouldn't have supported any readable voice transmission and would have made rough CW copy, there was 100% PSK31 copy!

With the output set to about 45-50 watts and using either a three-element tri-band beam or a simple wire antenna at 25 feet, I was soon working stations all over the world. Over the next two and a half months I made over 250 contacts with 90 countries from Europe, Africa, South America, Central America, the Caribbean, North America, Antarctica and Asia on PSK31 and RTTY. This was easier than working voice or CW – it was just a matter of tuning the bands looking for signals and then: point and click. At a time when the bands were "dead," there was suddenly new life on the airwaves!

Basic Digital Mode Frequencies

Band	PSK31	RTTY	SSTV
160 (Mtrs)	1.800-10	1.800-10	1.843-2.000
80	3.580	3.580 3.590 (DX Window)	3.845
40	7.070	7.040 (DX Window)	7.171
30	10.1371	10.130-140	
20	14.070	14.080-095	14.230
17	18.100-105	18.100-105	
15	21.070	21.080	21.340
10	28.120	28.080	28.680

❖ The Digital Advantage

The digital sub-bands aren't nearly as crowded as the phone bands. Sure, there can be pile-ups, but nothing like the phone frequencies, because there are simply fewer digital operators. Here are some other advantages:

Digital modes work with any "modern" transceiver. All you need is a reasonable computer and a sound card interface.

It's a great equalizer in working DX stations for those of us not packing the half kilowatt amplifiers and expensive antenna arrays. Since almost everyone's operating relatively low power, we all have a decent chance to be heard.

It's the best way to beat the "sunspot cycle blues." While all the side-banders have given up and turned to their aquariums and stamp collections, digital ops are still working the DX!

It's a stealth mode of operating in your home without disturbing anyone. There's no need for headphones or to even have the speaker on. You monitor all the action silently on the screen. You can actually be working the world in the same room as someone else who's watching TV, reading a book or listening to music!

Mattie Clausen and Larry Van Horn were right! Once you've started down the digital trail you'll wonder why you hadn't done it before. So, what's next? Well, I think I'll try SSTV!

Race Scanning

Race Scanning



Chapters:

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- What you can hear
- Racing terms
- Racing flags
- Choosing a scanner
- Tips and tricks
- Racing frequencies

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Here's a question for our readers:

Q: I am trying to find an IC for my Realistic DX-300 receiver. The obsolete IC sources on the internet are of no use. The IC number is M54826P; the frequency counter is IC501. Do any of your readers have any ideas where I might get one or more?

(Jerry Beaudin, 2109 Co Rd 449, McMillan, MI 49853; 906-586-3021; kurro7@excite.com)

Q: Is there an easy way to contact the FCC to report excessive power, overmodulation splatter, and illegal tower height of AM and FM broadcasters? (Tom Shrilla, Westerville, OH)

A: Yes. Try this web site: <http://www.fcc.gov/eb/broadcast/interference.html>

Q: I have my ICOM R-75 shortwave receiver connected via RG-8/U coax to a PAR END FEDZ wire antenna. The radio is grounded, but not the antenna. Is there another antenna system that can give me better performance? (Jimmy Fulford)

A: There are no magical antennas. For passive (unamplified) shortwave receiving antennas, you want a wire 20-70 feet long, fed with coaxial cable. The wire should be at least 20 or more feet in elevation (preferably 40 feet or so), and its broadside should face the direction of greatest interest. Keep it as far as practical from the house and power lines to reduce electrical noise pickup. The PAR END FEDZ (Grove ANT-08) is an outstanding antenna.

Unless you are hearing interference like splatter, images or intermodulation from an overly-strong local broadcaster, you don't need any additional contraptions like a tuner or filter with the R-75. RG-8/U is excellent coax; you can't improve upon it for shortwave reception.

Audio quality can be improved with an external speaker, and electrical noise can be reduced with noise-canceling devices like the Timewave ANC-4 (Grove ACC-40) or DSP-599ZX (Grove FTR-05).

Grounding is optional with modern receivers; it may help reduce electrical interference and

prevent electrical shock if there's something wrong with the wiring, but it won't increase the signal level above the background noise (hiss). Since you're using coax, you've already grounded the antenna by grounding the radio chassis which is connected to the coax.

Q: As I look at a list of channel allocations for railroads (ch.7-97), I wonder what happened to channels 1-6? (Dan Rapak WA3ATV)

A: As with TV's original channel 1 (48-54 MHz), they have fallen victim to spectrum reallocation; they are now assigned to business and industrial services.

Q: I saw the **Area 51: Fact or Fiction?** special on TV that you were featured in. What did you hear on the scanners, and weren't you taking a risk? (Dave T., Copley, OH)

A: The comms at the super-secret Air Force base were pretty routine with no attempt to guard the transmissions. Most of it was air-to-air simulated combat, aircraft flight, and perimeter security teams. There was some minor DVP scrambling.

Our video team remained on public land and we weren't making nuisances of ourselves, so we didn't pose a threat to the security teams, nor they to us. All in all, it was great fun and a delightful experience in the desert north of Las Vegas.

Q: Whatever happened to FM channel numbers? I think a few FM stations still included them in station identification back in the 1960s. And I think the **FM Guide** used them. (Ron Lindow, Pittsburgh, PA)

A: The FCC still lists FM frequencies along with their channel numbers in legal documents, but for some reason, channel numbers never seemed to be as popularly accepted in the United States as they were in Europe. Similarly, early wavelength references to radio signals were replaced by actual frequencies, although some foreign broadcasters still refer to their meter bands.

These radio signals are all discrete frequencies, whereas TV channels are multiple, separate carriers for sound, picture and synchronization signals throughout a 6 MHz hunk of spectrum,

so channel references were more practical for TV allocations.

If any of our radio historians have additional information on the abandonment of radio channel and wavelength references, we'd be happy to share this with our readers.

Q: We use an AM radio in a steel-roof building, but interference from the ceiling fans with an adjustable rheostat and fluorescent lights is very bad. The adjustable fan produces the most static. Any solutions? (Greg Kraushaar, St. Paul, MN)

A: AM radio interference from fluorescent lights, speed-controlled fans and dimmer controls on lights is well documented. If you are using commercial wall speed control/dimmers, you can often reduce some of the interference by installing a capacitor, typically 0.047 (0.05) microfarads at 600 working volts (600 WV) across the control terminals that feed the fan or lights. Be sure to shut off the circuit breakers to these controls before attempting the modification! Be sure as well to dress the finished leads with electrical tape to prevent short circuits and shock hazard.

So far as the fluorescent ceiling lights, this may be due to improper, third-wire grounding of the lights as well as the presence of a sheet-metal roof which acts like a giant transmitting antenna for the noise!

I'm assuming you are using a conventional AM/FM radio with a built-in loop, so you can't physically connect an outdoor antenna via a coax cable. In this case, I'd recommend a passive, tuned loop antenna like the very popular and very effective Select-A-Tenna, available from Grove Enterprises and some other MT advertisers.

First, tune in your favorite station, then reposition the radio for minimum interference and best reception of the desired signal. Then set the loop next to the radio and adjust it to the same frequency, noting a distinct rise in signal strength. Adjust the loop position for best reception on your radio. You should note a substantial improvement in reception.

Questions or tips sent to Ask Bob, c/o MT are printed in this column as space permits. If you desire a prompt, personal reply, mail your questions along with a self-addressed stamped envelope (no telephone calls, please) in care of MT, or e-mail to bobgrove@monitoringtimes.com. (Please include your name and address.) The current Ask Bob is now online at our website:
<http://www.monitoringtimes.com>

The Essential Emergency Responder

As promised, this month's column deals with information, radios, frequencies, and the various items we need for being safe at home, on the road, or while responding in the capacity of a volunteer or professional first responder.

What kind of volunteer? Over the years, I have found that most folks interested in volunteering as local firefighters, emergency medical technicians (EMTs), paramedics, Community Emergency Response Teams (CERT), or Radio Emergency Associated Communication Teams (REACT) members, etc., are quite naturally interested in radios. They want the ability to listen so they know what is going on, as well as have the ability to communicate with their agency or team.

Know the Drill

With the ever-growing bonds between these radio groups, emergency agencies, and the federal Department of Homeland Security, there seem to be many more drills and exercises. It is important that those of us who are first responders participate in these exercises, even if it means taking the day off from work. Some drills run two or even three days which simulates a real event which often takes 24-72 hours to be brought under control. As first responders, we need to practice shift rotations and location flexibility.

Here in Spokane, we recently held a drill that involved the military (Air Force and Air National Guard), Washington State Department of Emergency Management, local fire departments, local ambulance service (AMR), local Department of Emergency Management, American Red Cross, several hospitals, Spokane Metro Bus Transit, and of course the Amateur Radio Emergency Service/Radio Amateur Civil Emergency Service (ARES/RACES) hams.

Operation "Ultimate Caduceus" was a region-wide drill. The scenario was an incoming overseas Air Force plane with about 80 "patients" that needed to be decontaminated and then triaged for transport to local hospitals. The Air Force plane landed at Spokane International Airport and taxied to the Air National Guard complex. Security was tight! The real federal Disaster Medical Assistance Team (DMAT) group from Seattle had flown in earlier on a C-17 with several pallets of supplies. They were joined by some federal US Army Reserve members who seemed to be there mostly for logistics support and observation.

Two large military style decontaminated tents had been set up under some extremely windy and cold (36°) conditions. Local volunteers played the role of patients with realistic "injuries," as well as chemical and biological symptoms to be evaluated. Those triaged as

red were immediately transported by ambulance. Green and yellow triaged patients were transported via metro transit buses. In addition to medical staff, a ham operator went on each bus.

Ham operators at the airport kept the hospitals informed as to how many patients were enroute. RACES had operators in the ER rooms at the four major hospitals. The sudden arrival of 20 or more patients put a strain on the local hospitals, but they seemed well prepared and staffed. Several distant hospitals which did not actually receive any patients still had a ham operator present to test the radio communications aspect of patient transportation. RACES operators also maintained cross state contact with the Washington State Department of Emergency Management via HF.

The eight hour exercise went very well; frankly, I could not find a single flaw in the system. Everyone, including, the hams, did a great job, and I should add that a great net control operator, Gordon WA7LNC, was pivotal to our success.

If you are an Emergency Coordinator (EC) for RACES or other group, you can email me for my entire (and lengthy!) evaluation. (I may regret that offer!)

Training is an important foundation of preparedness. I have often mentioned the FREE on-line courses at the Federal Emergency Management Agency (FEMA) website for their Emergency Management Institute. They have improved several classes, and added many NEW courses. Please go to <http://www.training.fema.gov/emiweb/IS/crslist.asp>. In particular, look at classes IS 195, IS 200 and IS 700. Additional training for amateur radio operators can be found at <http://www.arrl.org/cc/>.

Let me be very clear about the topic of communicating with official agencies or groups. Obviously, to be a member of ARES or RACES, you need to be a Federal Communications Commission (FCC) licensed ham radio operator. It is not that hard to get your license. You can purchase a booklet with ALL the questions, and ALL the answers from <http://www.mfjenterprises.com/products.php?prodid=MFJ-3211>. If you belong to some other group of responders, they will have their own policies and procedures for radio communications.

Listening In

Of course, anyone can listen to these radio communications to keep informed as to the nature of the event and how agencies are responding.

What frequencies? Naturally, the usual police, fire, and EMS frequencies. Hams primarily use the ham band between 144 and 148 MHz, but they could also be on 440 MHz or on HF for long range communications. In Washington state,

check the frequencies around 3.975 MHz. There are many other HF frequencies used. Some are ham and others are Federal government. Sorry, but I not at liberty to disclose those.

The American Red Cross can always be found on their nationwide lowband frequency of 47.420 MHz. Local Search and Rescue (SAR) can be heard on 155.160 and on the adjoining 155 MHz frequencies. The federal Urban Search and Rescue (USAR) use frequencies in the 400-420 range. Ditto for the DMAT. They share several common channels. Read the back issues of *MT* for information on these frequencies, or watch the *Milcom* column by Larry Van Horn or the *Fed Files* column by Chris Parris for future listings.

Being There

It has been my personal policy not to bring a camera to disasters or exercises. For one thing, I am not there to be a photographer, unless I am given that as a specific assignment. After 9/11 everyone seems to be suspicious of anyone taking pictures.

I also hesitate to drag my \$1,000 digital camera and accessories around. I already am burdened with radio and other personal equipment. But I just purchased a Motorola wireless phone model V551 which can take pictures. I can send them to an e-mail address for a quarter, or simply download them to my PC via USB cable. I see great possibilities for using this relatively simple technology for sending back a visual image of damage assessment or current operations to my supervisors, ICP, or EOC.

I am of the very strong opinion that radio volunteers need to carry proper identification, equipment, and be dressed appropriately. I highly recommend a specialty vest to carry your equipment and look professional. Here are three sources of such vests: Ruby J's Custom Sewing at 866-677-3909 (Pacific Standard Time) – 8 colors available and they are very customizable for around \$53. Cops 911 at <http://cops911.com/amateurRadiovest.asp> – top of the line vests but rather expensive. Barker Specialty Co at <https://www.barkerspecialty.com/arrlnew/> (27 Realty Drive, Cheshire, CT 06410: 1-800-227-5372) – the cheaper alternative. Also check for other ARRL apparel with the mandatory ANSI reflective strips.

For carrying your equipment, check out these Go Bag websites:

<http://www.thehallos.com/gobag.htm>
<http://gcares.febo.com/jumpkit.htm>
<http://www.duvalares.net/jumpkit.htm>
http://www.emcomm.org/gear_list.htm

Well, this started out to be an introductory paragraph and grew to become the entire column. Not my usual format, but I trust the information was valuable. Next month I will finish this preparedness topic with more specific information on radios, go-bags, and training. Keep listening!

California Scanning

The ability for public safety agencies to communicate with each other remains a challenge for many organizations. This month we take a look at how a California town upgraded their radio network to interoperate with surrounding communities. We'll also review a Michigan scanner law and highlight some unique features of two new scanners.

❖ Davis, California

The city of Davis, California, is in the process of replacing their 1950s-era VHF radio system. Police and firefighters have long complained about "dead spots" where their radios cannot communicate with each other or with dispatchers. The antiquated system also made it difficult to work effectively with other public safety agencies equipped with more modern equipment.

The city is located in the Central Valley of Northern California in Yolo County, a dozen miles west of the state capitol of Sacramento. Davis has more than 62,000 residents and is home to the University of California at Davis (UCD), which has 26,000 students on a 5,200-acre campus.

In January of last year the city received a \$400,000 federal grant that partially funded a new radio system, and the city council approved a funding plan to cover the remainder of the \$2.4 million cost. As of March 2005, a new Motorola 800 MHz trunked radio system is now operational.

Besides better coverage in trouble spots like the Yolo Causeway, the new radio system will allow interoperability with other Motorola 800 MHz systems in West Sacramento, UCD, and other Central Valley counties and municipalities.

The Federal Communications Commission (FCC) license database lists four repeater output frequencies for the new system: 866.6125, 867.0750, 867.5875 and 868.2125 MHz. An additional channel, 858.2375 MHz, was previously used for Mobile Data Terminals but may be reassigned as part of the new system. All of these frequencies are transmitted from an antenna at Police Headquarters on 5th Street in Davis.

Voice traffic is primarily analog, although some activity may be APCO 25 digital. Here are a few talkgroups reported to be active:

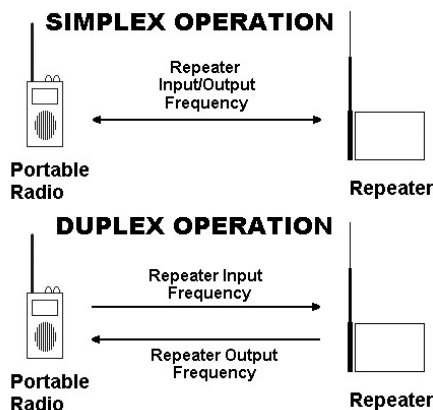
Decimal	Hex	Description
31568	7B5	Fire Dispatch (secondary)
43760	AAF	Fire Prevention
43856	AB5	Fire Training
44208	ACB	Police Tactical 2
44240	ACD	Police Dispatch (primary)

44272	ACF	Police Dispatch (secondary)
44304	AD1	Police Tactical 1
44368	AD5	Fire Dispatch (primary, simulcast on 154.370 MHz)
44400	AD7	Fireground 1
44432	AD9	Fireground 2
44464	ADB	Mutual Aid 1
44496	ADD	Mutual Aid 2

While the transition to the new radio system is underway, you may continue to hear activity on the old VHF frequencies. Smaller nearby towns, such as Dixon and Woodland, will continue to use the older equipment as well as work with Davis on those frequencies.

Davis Police were dispatching through a repeater that transmitted on 159.090 MHz. The repeater received transmissions from the field on 154.875 MHz. This two-frequency operation is referred to as *duplex*. A single frequency of 155.535 MHz was used as a secondary dispatch channel, where the dispatcher and units in the field all took turns transmitting and receiving on it. This type of shared one-channel operation is known as *simplex*.

Davis Fire will continue to use 154.370 MHz as a simplex dispatch channel. The town of Dixon is reported to use 155.085 MHz for Police and 154.085 MHz for Fire activity. Woodland Police can be found on 155.055, 154.535 and 154.770 MHz, and Woodland Fire on 160.065, 153.830 and 158.835 MHz.



In the Davis area the Yolo County Sheriff can be heard simplex on 155.850 MHz. County Mutual Aid can be heard duplex on 154.445, with input to the repeater on 159.525 MHz.

Davis Public Works has a duplex repeater operation, transmitting on 155.145 MHz and receiving on 156.015 MHz.

❖ University of California at Davis

The Regents of the University of California are licensed to operate 800 MHz trunked radio systems on campuses across the state. At UC Davis, an analog Motorola *simulcast* system simultaneously broadcasts from two repeater locations. One location is in Yolo County, on the Main Campus about a mile from the UCD airport. The other site is located at the UC Davis Medical Center on Stockton Boulevard in Sacramento.

The University has a requirement that there be adequate signal on each floor of campus buildings. If necessary, in-building repeaters or other signal aids are installed to ensure adequate signal strength.

Frequencies in use are 866.4875, 866.9875, 867.4875, 867.7125, 867.9875, 868.4875 and 868.6000 MHz.



Decimal	Hex	Description
80005		Police Dispatch
368	017	Police
496	01F	Campus Safety Escorts
528	021	Student Patrols
880	037	Security
1712	06B	Buses
1744	06D	Buses
2256	08D	Security
2288	08F	Transportation
2376	094	Campus Maintenance
2416	097	Transportation

❖ Sacramento, California

The city of Sacramento, California, operates their own Motorola 800 MHz trunked radio system with three repeater sites, located at the City Jail (Central), Brighton Heights (Southeast) and the Freeport Reservoir Tank (South). The system uses these frequencies: 866.0500, 866.2500, 866.4000, 866.5875, 866.7125, 866.7750, 867.0500, 867.1250, 867.3125, 867.3750, 867.4625, 867.6500, 867.8125, 867.8750, 867.9000, 868.1125, 868.1875, 868.2625, 868.3375, 868.5750, 868.6375, 868.6625, 868.8250 and 868.9000 MHz.

Decimal	Hex	Description
16001		Police Announcements
48003		Police (Central)
80005		Police (South)
112	007	Police (East)
144	009	Police (North)

176	00B	Police (Car-to-Car)
208	00D	Detectives 1
240	00F	Detectives 2
272	011	Records
304	013	Tactical 1
336	015	Tactical 2
368	017	Tactical 3
400	019	Tactical 4
432	01B	Tactical 5
464	01D	Tactical 6
496	01F	Tactical 7
528	021	Announcements
560	023	Administration
592	025	Training
624	027	Training
656	029	Narcotics 1
688	02B	Narcotics 2
1232	04D	Flood Control
1968	07B	Animal Control
2128	085	Parking Enforcement
7472	1D3	Park Service

The city of West Sacramento has a dedicated set of talkgroups on the system:

Decimal	Hex	Description
13328	341	Fire Announcements
13360	343	Fire Dispatch (simulcast on 154.445 MHz)
13392	345	Fire Administration
13424	347	Fire Tactical 1
13456	349	Fire Tactical 2
13488	34B	Fire Tactical 3
13520	34D	Fire Tactical 4
13552	34F	Fire Tactical 5
13584	351	Fire Mutual Aid 1
13616	353	Fire Mutual Aid 2
13648	355	Fire Mutual Aid 3
13680	357	Fire Mutual Aid 4
13712	359	Fire Training
13744	35B	Fire Dispatch Training
13840	361	Police Announce
13872	363	Police 1 Dispatch (Main)
13904	365	Police 2 Dispatch (Secondary)
13936	367	Police 3 Records
13968	369	Police 4 Administration
14000	36B	Police Tactical 1
14032	36D	Police Tactical 2
14064	36F	Police Tactical 3
14096	371	Police Tactical 4
14128	373	Police Tactical 5
14160	375	Police Tactical 6
14192	377	Police Tactical 7
14224	379	Police Detectives
14256	37B	Police Detectives 1
14288	37D	Police Detectives 2
14320	37F	Police Training
14384	383	Public Works

❖ Sacramento County, California

To the east of Yolo County lies Sacramento County, spanning nearly 1,000 square miles of the Central Valley. Within the county there are nine paramedic service providers and two air ambulance services delivering emergency care. In 2003 there were about 96,000 call-outs for 911 service, dispatched through the Sacramento Regional Fire/EMS Communications Center.

The County operates an analog Motorola trunked radio system on the following frequencies: 866.1125, 866.1375, 866.3500, 866.3750, 866.4375, 866.6375, 866.7500, 866.8125, 866.8375, 867.1000, 867.1625, 867.3500, 867.4125, 867.4375, 867.6875, 867.8375, 867.9375, 868.1375, 868.2375, 868.2875, 868.4375, 868.5375, 868.7375, 868.9375 and 868.9625 MHz.

Three repeater sites provide coverage for the

county, one on Carpenter Peak in Folsom, one on River Road in Walnut Grove, and four in Sacramento (Bond Road, Gibson Ranch County Park, I Street and Freepoint Boulevard).

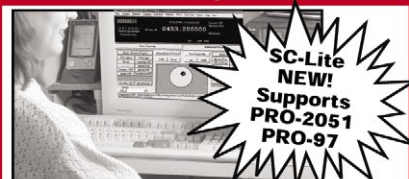
Decimal	Hex	Description
2576	0A1	County Fire Announcements
2608	0A3	County Fire Dispatch (simulcast on 154.190 MHz)
2640	0A5	County Fire (North)
2672	0A7	County Fire (South)
2992	0BB	County Fire (Administrative)
3024	0BD	County Fire (Prevention)
3056	0BF	County Fire (Arson)
3088	0C1	City Fire Announcements
3120	0C3	City Fire Dispatch (simulcast on 153.890 MHz)
3600	0E1	County Fire Announcements (Training)
3632	0E3	County Fire Dispatch (Training)
5136	141	Medical Announcements
5168	143	Hospital (Command)
5200	145	Hospital (Tactical)
5232	147	Hospital (Kaiser North)
5264	149	Hospital (Kaiser Roseville)
5296	14B	Hospital (Kaiser South)
5328	14D	Hospital (American River)
5360	14F	Hospital (Mercy General)
5392	151	Hospital (Mercy Folsom)
5424	153	Hospital (Methodist)
5456	155	Hospital (Mercy San Juan)
5488	157	Hospital (Sutter Roseville)
5520	159	Hospital (Sutter General)
5552	15B	Hospital (Sutter Memorial)
5584	15D	Hospital (University Medical Center)
5616	15F	Hospital (University Medical Center)
8208	201	Sheriff (North and Central)
8240	203	Sheriff (Northeast)
8272	205	Sheriff (South and Central)
8304	207	Sheriff (East)
8336	209	Sheriff Records
8368	20B	Sheriff (Airport)
8400	20D	Sheriff (Juvenile Offenders)
8432	20F	Sheriff (Car-to-Car)
8464	211	Sheriff (Offender Work Release)
8720	221	Detectives (Main)
8752	223	Detectives (North)
8784	225	Detectives (South)
8816	227	Detectives (Warrant Service)
8976	231	Sheriff (Narcotics)
9008	233	Sheriff (Narcotics)
9072	237	Sheriff (Special Operations)
9104	239	Sheriff (Special Operations)
9136	23B	Sheriff (Special Operations)
9168	23D	Sheriff (Special Operations)
9200	23F	Sheriff (Special Operations)
9232	241	Sheriff (Tactical, North)
9264	243	Sheriff (Tactical, East)
9296	245	Sheriff (Tactical, South)
9328	247	Sheriff (Tactical, Southeast)
10320	285	Sacramento Executive Airport
10448	28D	Sacramento International Airport (Shuttles)
10480	28F	Sacramento International Airport (Shuttles)
10512	291	Sacramento International Airport (Ground Operations)
10704	29D	Sacramento International Airport (Control)
11312	2C3	Regional Transit Buses
11408	2C9	Regional Transit Light Rail (North)
11504	2CF	Regional Transit Light Rail (South)
11536	2D1	Regional Transit Police
11600	2D5	Regional Transit Police (Tactical)
12336	303	Folsom Police Dispatch
12368	305	Folsom Police Records
12400	307	Folsom Police (Tactical 1)
12432	309	Folsom Police (Tactical 2)
12464	30B	Folsom Police (Tactical 3)
12496	30D	Folsom Fire
12528	30F	Folsom Fire (Tactical)
21040	523	County Animal Control
21072	525	County Animal Control (Tactical)
24112	5E3	County Coroner
27216	6A5	Freeway Service Patrol (Towing)
27248	6A7	Freeway Service Patrol

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❖ Michigan Scanner Permit

Hi Dan,

I read your website concerning the vehicle permit for scanner use in Michigan. When I read the part about them expiring after three years I was somewhat alarmed, because I have had this permit in Michigan for well over three years and was unaware of an expiration issue.

Today after work I stopped in at the Flint Michigan State Police (MSP) Post 35 and presented my permit to the desk officer with the question concerning expiration. He contacted MSP Communications Division (in my presence) by phone and their reply was that the older permits did indeed have an expiration date on the permit, but that the newer ones do not, and do not expire.

He did mention that they were "cracking down on those," I assume he meant mobile scanner use. He and the three other troopers there acted like they had never seen one of these permits, but they all recognized the MSP Director's signature on it. Thought that was interesting.

Just thought I'd pass this information along to you. I enjoyed your website.

Les in Davison, Michigan

If you're planning on driving in Michigan this summer, you should be aware of the state law regarding scanners in your vehicle. In Michigan it is illegal to have a scanner ("a radio receiving set that will receive signals sent on frequencies assigned... for police purposes") unless you meet one of the following criteria:

You are a "peace officer"

You hold an amateur radio license of technician class or better, or

You have a permit issued by the state police.

The actual law is set out in Michigan Compiled Law section 750.508:

VEHICLES EQUIPPED WITH SHORT WAVE LENGTH RADIO RECEIVING SETS

Sec. 508. (1) Any person who shall equip a vehicle with a radio receiving set that will receive signals sent on frequencies assigned by the Federal Communications Commission of the United States of America for police purposes, or use the same in this state unless such vehicle is used or owned by a peace officer or a bona fide amateur radio operator holding a technician class, general, advanced, or extra class amateur license issued by the federal communications commission, without first securing a permit to do so from the director of the department of state police upon application as he or she may prescribe, shall be guilty of a misdemeanor, punishable by imprisonment in the county jail for not more than 1 year, or by a fine of not more than \$500.00, or by both fine and imprisonment

CD-4 (7-96)

MICHIGAN STATE POLICE

PERMIT FOR USE OF SHORT WAVE RECEIVER IN VEHICLE

According to Section 750.508, MCL of 1970, as amended, this authorizes

of

SAMPLE

to operate a vehicle with a short wave radio receiver on radio frequencies licensed for police use, except those frequencies licensed for police radar.

[Signature]
Director

- in the discretion of the court.
(2) This section shall not be construed as restricting the use of radar detectors.

Although I am not a resident of Michigan I do travel there quite often, so I applied for a permit in November of 2003. About a month later I received a credit card-sized permit with my name and address on it. As Les indicates, the newer permits (like mine) do not have an expiration date.

I find it interesting as well that the Michigan State Police troopers did not recognize the permit. It would be prudent when driving in Michigan with a scanner to have either the permit or a copy of your amateur radio license with you, along with a copy of the Michigan law. Should you attract the attention of a police officer, you can at least hope to educate him or her regarding your radio equipment.

In March of this year Representative Elsenheimer introduced House Bill 4544 to the Michigan Legislature, which would change Michigan's scanner law to read:

- Sec. 508. (1) A person shall not commit or attempt to commit a crime while in possession of a radio receiving set that receives signals sent on frequencies assigned by the Federal Communications Commission of the United States of America for public safety purposes.
(2) A person who violates subsection (1) is guilty of a misdemeanor, punishable by imprisonment for not more than 1 year or a fine of not more than \$1,000.00, or both.
(3) This section does not apply to the use of radar detectors.
(4) A term of imprisonment imposed for violating subsection (1) may be imposed to run consecutively to any other sentence imposed for another violation arising from the same transaction.

This would seem to be a more reasonable law, making possession legal except while engaging in criminal behavior. As of this writing the bill has simply been introduced and is in the Committee on Judiciary. It has not been voted on by the legislature nor signed by the governor, so as of now it remains illegal to have a police scanner in your car unless you meet one of the three criteria listed above.

I have more details about Michigan's scanner law, along with a link to a permit application form, on my web site at <http://www.signalharbor.com/michigan.html>

❖ New Scanners

A couple of new trunk-tracking scanners have hit the market recently with some interesting new features.

The PRO-97 is a handheld scanner sold through Radio Shack that can trunk-track Motorola, EDACS (Enhanced Digital Access Communication System) and LTR (Logic Trunked Radio) as well as scan conventional systems. It has 1000-channel memory and an "ID tagging" feature that lets you assign a name to each frequency for easy identification.

The PRO-2051 is a desktop or mobile scanner that can also scan the "big three" trunked radio systems and has the same "ID tagging" feature.

Perhaps the most interesting feature of these



scanners is "Signal Stalker," which automatically locates nearby transmissions without the operator having to enter a frequency. I've used an Opto-electronics Scout Frequency Recorder for several years, which captures and displays nearby active frequencies. The Signal Stalker operates in a similar manner, allowing the operator to "sweep" a range of frequencies for activity. If an active frequency is found, it will be displayed and the scanner will automatically tune to that frequency. Frequency ranges can be locked out to avoid tuning to unwanted signals. Radio Shack claims that Signal Stalker is more sensitive than handheld frequency counters and can detect activity at greater distances, up to 1,000 feet away.

The scanners also have a number of pre-programmed search bands, including Marine, CB, Police/Fire, Aircraft, and Amateur (Ham) Radio. These searches allow the operator to easily check for activity in specific areas.

Both scanners have a "Skywarn" feature that allows the operator to quickly monitor amateur radio repeaters designated to carry severe weather observation reports. Skywarn reports typically appear on official NOAA (National Oceanic and Atmospheric Administration) broadcasts as well as television and radio, so listening to Skywarn may give the operator an early indication of dangerous weather activity.

The PRO-97 can be powered from ordinary AA-size batteries, avoiding the use of a proprietary (and expensive) battery pack. It can also use rechargeable batteries or an AC/DC power adapter.

Each scanner has identical frequency coverage, namely 25-54, 108-136.9875, 137-174, 216.0025-221.9975, 222-225, 225.025-405.975, 406-512, 806-960 (excluding cellular) and 1240-1300MHz.

PC interfacing and frequency cloning are features common to both units.

Although these scanners will cover the Military Air band and can trunk-track LTR systems, features which are missing on many scanners, neither will follow nor decode any digital systems. So, if you're looking to monitor APCO Project 25 systems the PRO-97 and PRO-2051 will not be of much use. However, if you want to quickly locate nearby activity as well as track analog trunked systems, either of these scanners might be just what you're looking for.

That's all for this month. More scanner information, links and frequencies can be found on my web site at <http://www.signalharbor.com>. I also welcome your questions, comments and activity reports via electronic mail to danveeneman@monitoringtimes.com. Until next time, happy scanning!



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Oddities: Is Short Wave Haunted?

Anyone else notice all the funny noises on short wave radio lately? It sounds like one of those creepy movies they show every year at Halloween, with plenty of creaks, moans, howls, and things that go bump in the night. The “oddities” – as unexplained weird signals are called – seem to be multiplying faster than insects in spring.

❖ The Squeaky Wheel Talks

Big news for “numbers” fans came when an especially bizarre-sounding oddity called “The Squeaky Wheel” suddenly turned into a female voice giving a callup and short message in Russian.

The Squeaky Wheel appeared in 2000, eventually settling down on or just above 3828.0 kilohertz (kHz). Like all these stations, it was given a humorous name from the sound it made, which is most definitely that of a bicycle wheel in very bad need of lubrication. Modulation type appeared to be some kind of audio frequency-shift keying, but with a predictable warble in the lower tone, and some tiny shifts in the high one.

It didn't take long to determine from propagation that the source was probably Russia, and therefore probably legal in this band. Best guess was that we had yet another of those funny-sounding channel markers the Russians love to put up, like The Pip and The Buzzer.

Nothing could be proven, though, until last March. That's when a British listener discovered the female voice, with a typically cryptic “numbers” message in upper sideband (USB). She has been heard several days since, always between 1800 and 1900 Coordinated Universal Time (UTC), always with four trigraphs. The first of these 3-number groups is clearly a callup. The remaining three are the message, or lack thereof. The whole thing is repeated three times. No other procedures are heard.

❖ A Night at the Races

A newer oddity was the steady, buzzing noise that was quickly named The Race Car. It was heard worldwide for a few weeks in late winter, fading in and out with the skip on 6249.0 and 13237.0 kHz. While it sounded like a simple pulse, spectrograms indicated a series of overlapping, rapid frequency sweeps. The whole thing really did sound a lot like the car races, thanks to ionospheric phase distortion, though the engines weren't quite hitting on all cylinders.

Another channel marker? Seems likely,

although theories on this one varied all the way from radar to a malfunctioning television broadcast transmitter. Spectrograms, however, seemed to reveal strings of frequency-shift-keyed characters, on a higher audio band just above the car noise. Was this just interference from another station, or the real content?

The mystery deepened when The Slot Machine – a really weird noise from a Japanese government radio system – turned up nearby. Skip indicated a Pacific origin for the Race Car, too. However, it hasn't been heard in a while, so we'll just have to wait.

❖ Yosemite Sam

This especially bizarre transmission was discovered last December, on 3700 kHz double sideband (DSB). It quickly turned up on 4300, 6500, and 10500 kHz, as well. These frequencies were on a 40-second rotation, with short beacon transmissions on the next one up (or back to start) every 10 seconds, like clockwork. Strong signals were heard worldwide.

Each transmission had a tone burst unlike anything else ever heard. It was quickly followed by a well-known cartoon voice that was most definitely Yosemite Sam threatening to blow Bugs Bunny to “smithereens.” This was quickly identified as half a sound clip from a public Web site. Presumably, the same computer was being used to make the sounds and control the radio.

Since it was Christmas, a holiday prank was suspected. Not quite as amused were the US amateur intruder watchers, who guard their valuable spectrum like junkyard dogs. When the Internet carried word of a suspected origin just west of Albuquerque, NM, Sam immediately vanished.

Was that all, folks? No way. Sam reappeared on January 15, this time with just the buzz and word “Varmint,” on 5000, 10000, 15000, and 20000 kHz. Yes, right under the WWV standard time/frequency station just to the north in Colorado. Talk about wanting to get noticed! Then, on February 9, Sam returned to the original four frequencies.

The hams went back to work, chasing the transmitter by car. They drove right up to a government and military contract facility on New Mexico's Laguna Pueblo Indian Reservation. It's called MATIC, which is an acronym for Mobility Assessment Test and Integration Center.

MATIC's name describes its work perfectly. It offers a wide-open range with varied terrain, used for testing advanced military radios. Radios which would, presumably, need computer control, flexibil-

ity, and instant frequency agility, and which would most likely trade data bursts like Sam's weird buzz. In other words, just what we'd been hearing!

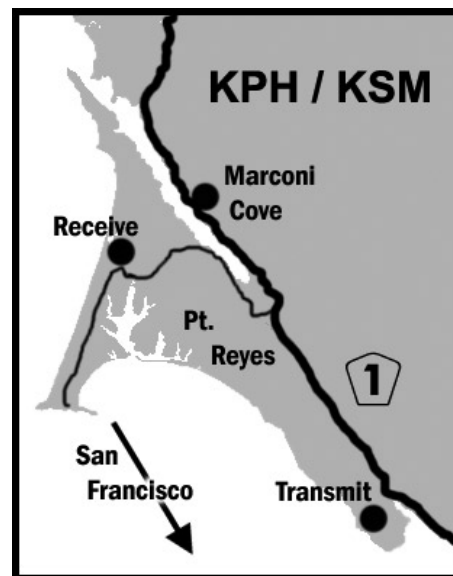
Sam vanished again, right after someone shooed the hams away from a MATIC building. Again, though, the station came back, this time in March, with the same buzz and a new, somewhat garbled, voice. It is still coming and going, last spotted on 1770 and 3890 kHz. Perhaps those responsible have a better reason than just a hobby radio joke. Could it be that all of this is a direction-finding exercise for someone other than the hams? This story is far from over.

❖ Commercial Morse Lives!

California's Maritime Radio Historical Society, which operates the partially restored KPH coastal station north of San Francisco, has just been granted the first FCC class 1A commercial maritime telegraphy license in decades. The callsign is KSM. Testing has already begun at the KPH site. Vintage equipment is used, and operators need the old FCC radiotelegraphy license.

While they don't expect much business, the station will be completely capable of taking commercial Morse code messages from ships, not to mention the required, cost-free relay of weather observations and positions. Initial frequencies will be 426, 500, 6474 and 12993 kHz, all 5000 watts.

Also, don't forget July's annual “Night of Nights” special event operation at KPH/KSM. See you next month.



ABBREVIATIONS USED IN THIS COLUMN

AFB.....	Air Force Base
AFRTS.....	Armed Forces Radio and TV Services
ALE.....	Automatic Link Establishment
AM.....	Amplitude Modulation
ARQ.....	Automatic Repeat Request teleprinting system
CAMSLANT.....	Communication Area Master Station, Atlantic
CAMSPAC.....	Communication Area Master Station, Pacific
CW.....	Morse code telegraphy ("Continuous Wave")
DEA.....	US Drug Enforcement Administration
DSB.....	Double-Sideband suppressed-carrier telephony
DSC.....	Digital Selective Calling
E3a.....	UK M16/SIS, musical callup, probably Cyprus
EAM.....	Emergency Action Message
FBI.....	US Federal Bureau of Investigation
FAX.....	Radiofacsimile
FEC.....	Forward Error Correction teleprinting system
HFDL.....	High-Frequency Data Link
HF-GCS.....	High-Frequency Global Communications System
M8a.....	Cuban CW "numbers" cut to ANDUWRIGMT
MARS.....	Military Affiliate Radio System
Meteo.....	Meteorological
MFA.....	Ministry of Foreign Affairs
MSI.....	Maritime Safety Information
Navtex.....	Navigational Telex
PACTOR.....	Packet Teleprinting Over Radio
PR.....	Puerto Rico
RSA.....	Republic of South Africa
RTTY.....	Radio Teletype
SITOR-A.....	Simplex Teleprinting Over Radio, ARQ mode
SITOR-B.....	Simplex Teleprinting Over Radio, FEC mode
UK.....	United Kingdom
Unid.....	Unidentified
US.....	United States
V2a.....	Cuban Spanish female "Atencion" numbers

All transmissions are USB (upper sideband) unless otherwise indicated. All frequencies are in kHz (kilohertz) and all times are UTC (Coordinated Universal Time). "Numbers" stations have their ENIGMA (European Numbers Information Gathering and Monitoring Association) designators in ().

421.2	UGC-St Petersburg Radio, Russia, CW marker at 2004. (Day Watson-UK)
518.0	"B"-Bodo Radio, Norway, SITOR-B Navtex at 2326. "V"-Augusta, Italy, at 2330. "X"-Cabo de la Nao, Spain, at 2354. (Patrice Privat-France)
1259.5	EKA-New Shipcom station, Yerevan, Armenia, SITOR-B traffic list and weather, at 1024. (Watson-UK)
1764.0	EAC-Tarifa Radio, Spain, traffic list at 1933. (Privat-France)
2182.0	EAL-Las Palmas Radio, Canary Islands, traffic at 1644 and 1689. (Privat-France)
2598.0	VON-Canadian Coast Guard, St John's, NFD, weather at 0640. (Privat-France)
3292.0	Cuban Spanish "numbers" (V2a), transmitter malfunction sounding more like DSB than AM, at 0200. (Tom Severt-KS)
3890.0	Unid-DSB beacon with the same buzz used by "Yosemite Sam," then garbled voice fragments at 0500. (Joe Tyburczy-CA) [Yes, it's good old Sam's latest strangeness, from west of Albuquerque, NM. Also 1770 kHz. -Hugh]
4207.5	PFOH-Vessel Levantgracht, DSC test call to Lyngby Radio, Denmark, at 2328. (Watson-UK)
4209.5	"P"-Chilung Radio, Taiwan, SITOR-B Navtex at 1830. (Watson-UK)
4218.5	LZW-Varna Radio, Bulgaria, SITOR-B weather in English, then MSI in Bulgarian, at 1836. (Watson-UK)
4369.0	WLO-Mobile Radio, AL, giving MSI schedule at 0205. (Jeff Seale-KY)
4780.0	CGOOPS-Possible US Army, ALE sounding at 0318. (Severt-KS)
5320.0	US Coast Guard Cutter Shearwater, working Group Atlantic City at 2346. (Mark Cleary-SC)
5547.0	Evergreen 6307-Evergreen International Airlines freighter, position for San Francisco at 0404. (Severt-KS)
5616.0	CKS 209-Kalitta Air 747 freighter, working Gander at 0123. Reach

5696.0	833Y-US Air Force Air Mobility Command charter, passing a report to North American Airlines via Gander, at 0147. (Clifford-UK)
5732.0	Coast Guard 2141-US Coast Guard helicopter working CAMSLANT on a search and rescue mission, at 0144. CAMSPAC, working Air Force Rescue 216, at 0259. (Rick Baker-OH) "O-2-D"-US Coast Guard, working CAMSLANT while dropping supplies to stranded migrants, at 2233. (Cleary-SC)
5757.0	Jack Knife-US Customs, FL, secure and clear with 41SK, at 0229. (Cleary-SC)
5800.0	Tusker 313-Canadian Forces CC-130, calling Halifax with no joy, at 0244. (Baker-OH)
5887.7	CHM721-Canadian Forces, Glace Bay, calling CHM723, also 6801.5 and 11132.5, ALE at 0031. (Ron Perron-MD)
6314.0	IMB2-Rome Meteo, RTTY weather at 1929. (Watson-UK)
6494.5	NMF-US Coast Guard, Boston, MA, SITOR-B weather and MSI at 0213. (Seale-KY)
6691.0	CFH-Canadian Forces Meteo, Halifax, NS, RTTY weather at 0140. (Seale-KY)
6694.0	"L-O-Y"-Military, tracking link coordination with patches to Boulmer, UK, at 1015. (Privat-France)
6709.0	Pathfinder 20-Canadian Forces, working Halifax at 1218. (Cleary-SC)
6712.0	NOJ-US Coast Guard, Kodiak, AK, calling J12 in ALE, at 0242. (Cleary-SC)
6715.0	CO0046-Continental Airlines, HFDL position for station 3, Reykjavik, Iceland, at 1003. (Watson-UK)
6721.0	Halifax Military-Canadian Forces, RTTY and voice with Swordfish 17, at 1124. (Cleary-SC)
6721.0	Coast Guard 1500-US Coast Guard, ALE-initiated call to Elizabeth City Ops, at 1927. (Cleary-SC)
6739.0	HLK-Hickham AFB, Hawaii, calling JTY, Yokota, Japan, in ALE at 1714. (Bob Hall-RSA)
6745.0	Navy CW 950-US Navy, patch via Ascension HF-GCS to Norfolk Base Ops, at 2327. (Cleary-SC)
6761.0	Rescue 326-Canadian Forces, sent to 5717 kHz by Trenton, at 0309. (Cleary-SC)
6911.5	UHAUL 99-US Air Force transport, calling tanker Mash 83, answered by Blue 82, at 0100. (Cleary-SC)
6959.0	T4Z101-US Army, KY, working helicopters in ALE, also 9081.5, at 1559. (Perron-MD)
7038.7	Lincolnshire Poacher-UK "numbers" (E3a), Poacher tune and 5-figure groups, parallel 10426, at 2230. (Severt-KS)
7038.8	"D"-Russian Navy CW cluster beacon, Odessa, also 10871.7, at 0713. (Ary Boender-Netherlands)
7038.9	"P"-CW cluster beacon, Kaliningrad, at 0713. (Boender-Netherlands)
7039.0	"S"-CW cluster beacon, Arkhangelsk, also 10871.9, at 0713. (Boender-Netherlands)
7508.0	"C"-CW cluster beacon, Moscow, also 10872, at 0713. (Boender-Netherlands)
7520.0	ZSC-Cape Town Radio, RTTY weather parallel on 13538, at 0956. (Hall-RSA)
7646.0	Cuban AM Spanish female (V2a), 5-figure groups at 0910. (Severt-KS)
7903.5	DDH7-Hamburg Meteo, Germany, RTTY synoptic codes at 1836. (Watson-UK)
8058.6	LR1-FBI, Little Rock AR, calling GM1, Guam, ALE at 0320. (Perron-MD)
8146.1	WNG-US State Department, calling WLU, WNG752, and WNG753, ALE at 1231. (Perron-MD)
8414.5	IMB55-Rome Meteo, FAX charts at 1500. (Watson-UK)
8416.5	S6FD-Vessel Aniana, DSC distress call at 0915, 0927, and 0931. (Watson-UK)
8430.0	NMF-US Coast Guard, Boston, SITOR-B MSI at 0210. (Seale-KY)
8834.0	RRR34-Moscow Radio, SITOR-B traffic list at 1417. (Watson-UK)
8879.0	ZS-SJT-South African Airways flight 679, HFDL position for Johannesburg, at 1525. (Hall-RSA)
8930.0	CRL 914-Corsair International 747, position for Gander at 1848. (Clifford-UK)
8942.0	UAL 923-United Airlines, troubleshooting electrical problems in a patch via Stockholm Radio, Sweden, at 1125. (Clifford-UK)
8971.0	SU290-Aeroflot, HFDL position at 1433. (Watson-UK)
8977.0	Red Talon 71G-US Navy, working Jaguar at 2328. (Cleary-SC)
8983.0	N67157-Continental Airlines, HFDL message at 1441. (Watson-UK)
	CAMSPAC Point Reyes-US Coast Guard, CA, working Coast Guard 1701, at 1953. (Severt-KS)

- 8992.0 Offutt-US Air Force HF-GCS, NE, with EAM "for whisky and yankee force," at 1248, then working Andrews Training at 1412. (Jeff Haverlah-TX) "O-6-T"-US Air Force, patch via Andrews HF-GCS to "4-L-X" with Exercise Esteem Highly Alpha message, at 1356. (Cleary-SC)
- 9007.0 Coast Guard 1503-US Coast Guard HC-130 on International Ice Patrol, working Trenton at 1838. RAF AIR 7493-UK Royal Air Force, working Trenton at 2342. (Cleary-SC)
- 9025.0 Quid 99-US Air Force tanker, ALE-initiated patch to Charleston AFB, regarding refueling of Grits 91, at 2333. (Cleary-SC)
- 9145.0 RIW-Russian Navy, Moscow, calling RIT81 at 1400. (Watson-UK)
- 9251.0 Lincolnshire Poacher-UK female voice with 5-number groups (E3a), parallel 12603, at 2241. (Sevart-KS)
- 9330.0 Cuban "Cut Numbers," CW 5-figure groups (M8a), at 0413. (Sevart-KS)
- 9972.0 PNR400-US DEA, Caribbean, ALE sound at 0047. PANTHR-DEA, Bahamas, ALE sound at 0240. (Watson-UK)
- 10066.0 LH8409-Lufthansa Airlines, HFDL log on to Hat Yai, Thailand, at 1539. (Watson-UK)
- 10100.8 DDK9-Hamburg Meteo, RTTY weather in ship synoptic code, at 1652. (Watson-UK)
- 10536.0 CFH-Canadian Forces, Halifax, FAX ice charts at 0015, RTTY weather at 0232. (Seale-KY) CFH, FAX at 1527. (Sevart-KS)
- 10666.0 MAS 2-Malaysian Airline System, calling Yangon, Myanmar, at 1710. (Clifford-UK)
- 10691.5 812189-US Army, AL, calling GRB, probably Ghost Rider Base, KY, ALE at 2040. (Perron-MD)
- 10714.0 Cuban "Cut Numbers," CW 5-figure groups (M8a), at 0202. (Sevart-KS)
- 11175.0 "M-5-E"-Probable US Air Force, patch via Puerto Rico HF-GCS for an Exercise Esteem Highly Alpha message, at 1401. Andrews-US Air Force HF-GCS, MD, sending Andrews Training to 13247, at 1540. (Haverlah-TX) Unid-Male, making rude noises and saying "No way!" during McClellan Global EAM at 1807. (Sevart-KS) Skier 91-NY Air National Guard, patch via Puerto Rico to Schenectady, NY, regarding snow on the runway, at 2152. (Cleary-SC)
- 11205.0 Shark 67-US Joint Task Force, working Smasher, FL, at 1955. (Cleary-SC)
- 11217.0 DHM91-German Air Force, calling "99" at 2202. (Cleary-SC)
- 11232.0 Canforce 4950-Canadian Forces, working Trenton regarding Sigonella (Italy) departure at 1201. (Cleary-SC)
- 11285.0 QFA 5-Qantas flight working Chennai, India, at 1821. (Clifford-UK)
- 11285.0 SIA 324-Singapore Airlines, working Colombo, Sri Lanka, at 1722. (Clifford-UK)
- 12119.0 Cuban "Cut Numbers," CW 5-figure groups (M8a), at 0115. (Sevart-KS)
- 12133.5 American Forces Network-Probably US Navy, repeating AFRTS satellite, at 1953. (Sevart-KS)
- 12215.0 Cuban AM Spanish female voice (V2a), 5-figure groups at 0200. (Sevart-KS)
- 12359.0 Southbound II Coastal-"Herb Hilgenberg's Net," Ontario, Canada, passing weather information to many small vessels at 2009. (Sevart-KS)
- 12479.0 Unknown-Vessel working WLO on SITOR-A channel 1206, coast transmitting on 12582, at 1652. (Sevart-KS)
- 12577.0 VRWU4-Vessel Yong Tai, DSC test call to US Coast Guard Miami, FL, at 1958. USCG Miami, responding in DSC at 2000. (Watson-UK)
- 12579.0 NRV-US Coast Guard, Guam, SITOR-B weather at 1500. (Watson-UK)
- 12585.0 WLO-Mobile Radio, AL, SITOR-B info and traffic list at 1605. (Sevart-KS)
- 12587.0 LZW-Varna Radio, Bulgaria, SITOR-B news in Bulgarian, at 1008. (Watson-UK)
- 12593.5 EKA-Yerevan Radio, Armenia, SITOR-B traffic list and weather, at 1430. (Watson-UK)
- 12606.0 UIW-Kaliningrad Radio, operator chatter in 3-shift Cyrillic SITOR-A, at 1715. (Watson-UK)
- 12701.0 CKN-Canadian Forces, Matsqui/Esquimalt, BC, RTTY channel availability marker, at 1700. (Sevart-KS)
- 12840.5 PBC-Danish Navy, Goeree, RTTY channel availability marker at 2303. (Sevart-KS)
- 12857.0 6WW-French Navy, Dakar, Senegal, RTTY "brick" test loop at 0100. (Sevart-KS)
- 13089.0 NMN-US Coast Guard CAMSLANT Chesapeake, weather at 1737. (Sevart-KS)
- 13092.0 EKA-Yerevan Radio, Armenia, testing at 1516. (Watson-UK)
- 13101.0 WLO-Mobile Radio, AL, voice synthesized weather and traffic list at 2107. (Sevart-KS)
- 13110.0 WLO-Mobile Radio, AL, MSI and traffic list at 1900. (Sevart-KS)
- 13155.0 Overture-US military, repeated 28-character EAM at 1829, 1841, and 1909. Play Suit-Same operator a week later, two 28-character EAMs at 1940, repeated the first at 2010. (Don Storck-MI)
- 13257.0 Navy LL 23-US Navy P-3C, came from 11232 for a patch via Trenton, at 1549. (Cleary-SC)
- 13303.0 17-New HFDL station, El Goro, Canary Islands, squittering at 1357. (Watson-UK)
- 13321.0 ZS-SJN-South African Airways flight 160, HFDL position for Johannesburg, at 0751. (Hall-RSA)
- 13436.0 Cuban AM "numbers" (V2a), dead carrier at 0100, then started message in the middle at 0114. (Sevart-KS)
- 13503.6 KWL92-US State Department, calling KWL90, Manila, ALE at 1509. (Perron-MD)
- 13510.0 CFH-Canadian Forces Meteo, Halifax, NS, RTTY weather at 1427, FAX charts at 1540. (Sevart-KS)
- 13927.0 Reach 325Y-US Air Force Air Mobility Command, patch via MARS AFAIRE, ME, for weather at Mildenhall, UK, at 1302. (Cleary-SC)
- 13945.0 Pack 11-US Air Force Reserve tanker, patch via MARS to Pack Control, NH, at 2050. (Sevart-KS)
- 13945.0 TUD-Tunisian ALE net, calling STAT1, also 14700, 15635, and 16285, at 1019. (Watson-UK)
- 13946.7 STAT154-Tunisian government/military net, PACTOR-II traffic for STAT1, at 0945. (Watson-UK)
- 13993.0 AFA4C-US Air Force MARS, calling Ramstein at 1833. (Sevart-KS)
- 14493.5 SE1-FBI, Seattle, WA, calling AN1, Anchorage, AK, ALE at 1703. (Perron-MD)
- 14680.0 KNY25-Romanian Embassy, DC, calling CENTR5, Romanian MFA, ALE at 2102. (Perron-MD)
- 14813.0 DBFA-Unknown CW station, working DP9D at 1622. (Watson-UK)
- 14996.0 RWM-Russian standard time station, Moscow, CW pips at 1652. (Watson-UK)
- 15016.0 Milky Way-US military, with a 28-character EAM simulcast on 8992 and 11175, at 2000. (Haverlah-TX)
- 15043.0 537987-US Air Force tanker, calling GLOB (Global), ALE at 1807. (Perron-MD)
- 15094.0 NCS009-US National Communications System, calling 444, also 17487, ALE at 2037. (Perron-MD)
- 15920.0 CFH-Canadian Forces, Halifax, NS, RTTY marker at 1528. (Watson-UK)
- 16283.6 KRC81-US State Department, calling KRC84, ALE at 1251. (Perron-MD)
- 16806.5 Unknown, probably US Coast Guard, with MSI at 1710. (Hall-RSA)
- 16829.5 UCE-Arkhangelsk Radio, Russia, working unknown vessel in 3-shift Cyrillic SITOR-A, at 1042. (Watson-UK)
- 17069.7 JJC-Tokyo Radio, Japan, Kyodo News English FAX newspaper at 1210. (Hall-RSA)
- 17147.0 URL-Sevastopol Radio, Ukraine, working vessel Konstruktor Koshan in RTTY, at 1716. (Hall-RSA)
- 17441.5 5YE-Nairobi Meteo, RTTY weather in French and English, at 1722. (Hall-RSA)
- 17458.5 A090ZN-Arizona National Guard, calling H090IN, Hawaii, ALE at 1641. (Perron-MD)
- 18003.0 NW1-Nightwatch 1, US military airborne command post, calling NW4 (Nightwatch 4), also 15043, ALE at 1506. (Perron-MD)
- 18248.6 KWK96-US State Department, calling KWK97 and KWK98, also 20810.6, ALE at 1735. (Perron-MD)
- 18571.5 S8V-Probably Tunisian diplomatic, FEC no-traffic marker at 1000. (Hall-RSA)
- 19602.0 AAA-Israeli Air Force, ALE-initiated Hebrew voice contact with M75, at 1625. (Perron-MD)
- 19814.0 037RMRCAP-Civil Air Patrol, Rocky Mountain Region, ALE sounding at 2045. (Perron-MD)
- 20503.0 KNY25-Romanian Embassy, Washington, DC, calling CENTR4 in ALE at 2054. (Perron-MD)
- 20810.6 KWK-US State Department, calling WNG746, ALE at 1742. (Perron-MD)
- 21955.0 17-HFDL ground station, El Goro, working N67052, at 1405. (Watson-UK)
- 21982.0 SU0220-Aeroflot flight, HFDL position at 1021. (Watson-UK)
- 22389.5 NMN-US Coast Guard CAMSLANT, VA, CW identifier in SITOR-A calling marker, at 1657. (Watson-UK)

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Co-ordinate or Get Covered!

Argentina's shortwave stations should have learned a lesson by now, since two of their long-time frequencies were covered by other stations from March 27, the beginning of the A-05 season. Argentina was not represented at February's High-Frequency Coördinating Committee meeting, held in Mexico City. As a result, other stations moved in on their frequencies. Whether these stations, HCJB and Voz Cristiana, were aware of Argentina's usage is open to question. The prevailing attitude at HFCC seems to be: if it's not on their schedule, it doesn't exist. Actual monitoring or, heaven forbid, consulting *Monitoring Times* or DX publications, is not an option.

Specifically, to accommodate Bulgaria, between 2100 and 0100 UT, HCJB moved from 11700 to 11710 – where Argentina has been for as long as we can remember. We can only imagine the collision during the first part of this period, when both are broadcasting to South America. During the latter part, HCJB also beams to North America and RAE is nothing but an off-frequency heterodyne here at best.

Some stations are frequency-agile and others are not. Those who are not are at a disadvantage. Being stuck on one frequency no matter what is a result of several factors, such as a domestic-broadcasting mentality where each station has one fixed frequency, and of transmitters which are designed for one frequency and not easily changed even if desired. Since stations exist to be heard by listeners, it is the listeners who are the ultimate losers in this game, as long as stations cannot get their acts together (or rather, apart!).

The Argentine stations are apparently so out-of-contact, that we decided to try to resolve these conflicts. Once aware of the problem (after all, it degrades their reception, too), HCJB was amenable to making a change and was looking for another frequency, but none had been found by presstime.

The other case is less balanced: a 100-kW multiple-frequency international broadcaster (Voz Crista from Santiago, Chile) vs. a low-power quasi-domestic station, but one which is the only voice from its entire

continent on the SW broadcasting bands (LRA-36, Radio Nacional Arcángel San Gabriel, Base Esperanza, Antarctica). Until this season VC had used 15475 during part of the day, but not before 2100 UT, which happens to be the end of LRA-36's 3-hour daily broadcast on 15476. Sometimes there was a brief overlap, but everyone was happy.

Now, VC suddenly expanded that usage to 12 hours a day, 1200-2400 UT, blanketing LRA-36's broadcast. At first, excuses were made that there was no collision, since VC is targeting Brazil and LRA-36 is not. Unfortunately, SW signals are not so confinable! VC is probably capable of overpowering LRA-36 in Brazil, where the latter may be no more than a heterodyne. But except for a skip zone around Santiago, LRA-36 is likely to be totally blocked by VC all over South America and the rest of the world where it used to be possible to hear LRA-36. It had been reported from North America, Europe and Japan, although certainly as a rather rare catch.

An even greater problem from VC's point of view is Africa Number One, Gabon, which also uses 15475, currently at 1600-1900 for NW Africa. These two produce a big collision both in South America and Africa (and North America, too, as we have monitored). Yet VC stuck to 15475 and did not reply to our notification of these conflicts. The higher bands are not so crowded that all these stations could not each be on a clear frequency of its own. All it takes is the flexibility and professionalism to make the necessary changes so everybody wins.

HFCC A05

For what it's worth, the incomplete HFCC A-05 frequency schedule is at: <http://www.hfcc.org/data/index.html>

EiBi A-05 Schedules

These are more complete, and compiled separately by Eike Bierwirth, both in time and frequency order. The time version for A-05: <http://www.susi-und-stroch.de/eibi/bc-a05.txt>

AFGHANISTAN [non] Surrogate services, A-05 via VT Communications, in Dari/Pashto: Internews / Salaam Watandar: 0230-0400 15240, Samara, Russia, 250 kW, 140 degrees; 1300-1430 15500 Rampisham, UK, 500 kW, 95 degrees. Radio Solh/Radio Peace: 1200-1800 17700 Rampisham 500 kW, 85 degrees (Observer, Bulgaria) 17700 comes in well here off the back, enjoyable music (gh, OK)

ALASKA By mid-April, KNLS on its English website was finally showing the old one-transmitter schedule as current, including English at 0800 on 11870, 1300 on 9615; but on its Chinese and Russian pages a different two-transmitter schedule with some additional English: 0800 11870, 1000 9795, 1200 9615 9780, NOT at 1300, 1400 on 9795. Tnx to Eric Zhou for pointing out the Chinese version (legible in English) (gh)

ARMENIA Public Radio of Armenia on new 9775 including English 1825-1845, also 4810, not on announced 11640 (Mike Barraclough, UK, DX Listening Digest)

BANGLADESH Bangladesh Betar, 7185, has been making it to NAm better than before at 1230-1300; includes mailbag show on 2nd and 4th Fridays, *From You to Us* (Richard Read via Mike Barraclough, World DX Club Contact)

BOLIVIA Radio Virgen de Remedios, Tupiza, Potosí, was heard very well between 2000 and 2400 with good audio quality, but SSB interference, on 9193; another day at 1200 they had gone down to 9187 (Adán Mur, Paraguay, Conexión Digital) Last June-July this was heard testing on 5500 and 5945 (LA-DX) Later it drifted up to 9207-9228, good signal and audio with relays of WEWN (Alfredo Locatelli, Uruguay, Conexión Digital) unID only with music on 9223 2245-2251* April 15 (Jan Edh, Sweden, SW Bulletin)

BRAZIL Radiodifusora Roraima active again in April, varied around 4876.34; one of my favorite Brazilians (Adán González, Venezuela, DXLD)

BULGARIA R. Varna's weekly broadcast to the Black Sea is on 7400, 100 kW non-direc-

tional, from Sunday 2100 to 0300 Monday (Observer, Bulgaria) Or just 2115-0100; address is: Radio Varna, Primorski Boulevard 22, Varna 9000, Bulgaria (Rumen Pankov, R. Bulgaria DX Program via John Norfolk, DXLD)

BURMA [non] A-05 Democratic Voice of Burma: 2330-2430 9435 Jülich 100 kW; 1429-1526 17625 Madagascar 50 kW; 1430-1530 5910 Almaty 200 kW (via Wolfgang Büschel, BC-DX)

CANADA Best bets for hearing RCI/CBC in NAm: 1200-1500 weekdays, 1300-1600 weekends on 9515, 13655, 17800; 1900-2200 on 17765 (for Caribbean and SE USA, yet beamed WSW at 240 degrees); 2000-2100 15325 (for Europe at 60 degrees, but good here off the back at 240); 0000-0200 on 9755, 11990, 13710 (gh)

CENTRAL AFRICAN REPUBLIC [non] Radio Ndeke Luka A-05 in French and Sango via VT Communications: 1730-1930 11760, Dhabbaya, UAE, 250 kW, 245 degrees; 1830-1930 15470, Woofferton, UK, 300 kW, 152 degrees (Observer, Bulgaria)

CHINA [non] Last month's item about CRI via Albania, 0000-0357 lacked the frequencies! 6020 and 9570 (gh)

COLOMBIA R. Líder, 6139.78 at 0653 superb reception, also at 0115, two hours before sunset, very powerful (Walt Salmaniwi, BC, DXLD) Romantic music, also very good here until blocked by DW at 0559 (Manuel Méndez, Spain, *ibid.*) Lucked into a relatively clear frequency, in our evenings, except when Cuba shows on 6140, and Turkey at 0300-0400 (gh)

CROATIA [and non] V. of Croatia, 9925 via Germany, 2215-2230, rapid-pace American English, but announcers had clearly Croatian names, concluding with one minute each of sports (NBA Croatians), weather, headlines; another Croatia Today time (converted from local): 0200 and an update at 1800, wrong frequencies (gh) Actually heard 1805-1815 on 6165, 13830 direct (Mike Barraclough, World DX Club Contact)

CUBA On April 5 at 2025, instead of the usual R. Nacional de Venezuela relay on 13680, I heard 5-

*All times UTC; All frequencies kHz; * before hr = sign on, * after hr = sign off; // = parallel programming; + = continuing but not monitored; 2 x freq = 2nd harmonic; A-05=summer season; [non] = Broadcast to or for the listed country, but not necessarily originating there; u.o.s. = unless otherwise stated*

digit Spanish YL spy numbers; open carrier pause from 2040 until starting over at 2059 with "Atención 888,16"; other days back to Caracas or no signal (gh)

DJIBOUTI As expected thanks to US aid in exchange for R. Sawa on 1431, RTV Djibouti was able to resume SW after some 30 years' silence, on 4780, first reported March 18 by Thorsten Hallmann, Germany, at 1736, and then heard all over the world thanks to refurbished antenna and new 100 kW transmitter (gh) Until sign-off with anthem at 2002 (Mika Mäkeläinen, Finland, *dxing.info*) Heard until fade 0420, more than hour past local sunrise (Guy Atkins, WA, HCDX) From sign-on at 0300 and a big open carrier before then (Scott R. Barbour, Jr., NH, DXLD) Very strong every evening past 0400 (Adán González, Venezuela, *ibid.*) Under Guatemala at first, then dominating (Rich D'Angelo, PA, NASWA *Flashsheet*)

ECUADOR New station heard in mid-April testing on 4909.27, Radio Chaski, Otavalo, Imbabura. Talked to Señor Chaquiguango Cotacachi Luis, who told me he is also owner of Chaskis del Norte, Ibarra, on 950 kHz. Is very interested in receiving reception reports to: Radio Chaski, Jirón Roldos Aguilera y Panamericana Norte, Otavalo, Imbabura, Ecuador. email: radiochaskis@hotmail.com (Björn Malm, Quito, DXLD) Fair signal here with folk music from 0130 to closing at 0300 (Rafael Rodríguez, Colombia, *condiglist*) Testing from 2310 past 0000 on 4909.26 (Jan Edh, Sweden, SW *Bulletin*) This appears in government's *Supertel* PDF SW page; remember when 4910 was Emisora Gran Colombia in Quito? (Dario Monferini, via Malm)

Radio Quito at 0251 on 4918.98, reactivated (Mark Veldhuis, Netherlands, *dxing.info*)

EGYPT R. Cairo heard on new 11885, English to NAm, 2300-2430, somewhat muddy modulation, but good signal and no interference (gh) English to Europe continues 2115-2245 on 9990. To SAs 1215-1330 on 17835 and Af 1630-1830 on 11880 (Mike Barraclough, World DX Club *Contact*) WWCR shifted from 9985 to 9975 until 2200, good news for half of Cairo's broadcast (gh)

ETHIOPIA [non] A-05 R. Mustaqbal via VT Communications, Dyabbaya, UAE, 15530, 250 kW, 225 degrees in Somali Mon/Tue/Thu: 0630-0700 and 1130-1200 (Observer, Bulgaria)

Two new target radio programs (with political background) in Amharic appeared on TDP <http://www.airtime.be/schedule.html> – Tensae Ethiopia Voice of Unity, Sun 1500-1600 on 15660; and Radio Voice of ENUF, Fri and Sun 1700-1800 on 12120, website <http://www.enufforethiopia.org> (Bernd Trutenau, Lithuania, DXLD) ENUF already – means Ethiopian National United Front (gh)

FRANCE [and non] RFI A-05 English; A=Ascension, C=China, G=Gabon, S=South Africa. Frequencies in () replace the preceding one from Sept. 4. Af/ME: 0400-0430 7315-G(9805-G) 11700; 0500-0530 9825-G(11995-G) 15160(13680); 0600-0630 11665-A 15160 17800; 0700-0800 15605-G; 1200-1230 17815-A 21620; 1600-1700 7170-S 15160-S 17850; 1600-1730 15605 17605; India 1400-1500 9580-C(7180-C) 15615 (RFI website via Jean-Michel Aubier, France, DXLD)

GREECE [and non] English from VOG: daily 1830-1855 *Orientation* program including news on 12105; Sun 0905-1000 *It's All Greek To Me*, music on 9420 11645 15630 15650 21530. *Hellenes Around the World*, Sat 1400-1500 on Delano 9775, subject to sports preemptions (John Babbis, MD, DXLD)

HUNGARY R. Budapest, English to NAm at 0100-0130 is on 9590 except Sundays on 9560; 0230-0300 daily on 9795 (Bob Thomas, CT, DXLD) What conflict could be pushing them off 9590 one day a week? No clues in HFCC A-05 as censored (gh)

IRAN VIRI's "Voice of Justice" heard on unannounced 9495, at 0130, still announcing 6120, heard weakly, and 9580 blanketed by CRI relay, tho pristine via satellite (Loren Cox, Jr., KY, DXLD)

[non] R. Seda-ye Mellat-e Iran [probably via Issoudun, France] clandestine in Persian, moved an hour earlier for summer to 1330-1359:50 but clashing with China's CNR8 program, also followed by Iranian jammers, bubble type on 11629, and oscillating tone on 11630.28 (Wolfgang Büschel, BC-DX)

A-05 Seda-ye Iran / Voice of Iran in Farsi: 1530-1730 on 11575 Sofia, 100 kW, 90 degrees.

New clandestine in Farsi from March 28, Seda-ye Jambushi Iran e Farda, 1600-1645 on 7490 Moldova, 500 kW, 116 degrees (Observer, Bulgaria) Not to be confused with our R. Farda (gh)

This time and frequency are registered for FEBA! (Wolfgang Büschel, BC-DX) Gave web-address as <http://www.sosiran.com> and e-mail as hasteh@sosiran.com Run by the Iran of Tomorrow Movement, 17328 Ventura Blvd. #209, Encino, CA 91316, USA. Certainly seems like a clandestine. E.g. says Iran of Tomorrow Movement is looking for volunteers dedicated to the cause of Democracy in Iran. If you are in full agreement with IOTM's Mission, Vision and Plan, Please fill out the form and fax it to 818-474-7229. We will get back to you as soon as possible. NOTE: DO NOT SEND US ANY PRIVATE INFORMATION SUCH AS YOUR REAL NAME, PHONE NUMBER, ETC. To register a 1-5 person cell (Finn Krone, Denmark, BC-DX) Iran of Tomorrow Movement Inc. (IOTM) is a Not-For-Profit 501(c)(4) organization (activistchat.com via Bernd Trutenau, BC-DX)

ISRAEL IBA A-05 schedule states: "According to IBA request, all broadcasts cease at 30.06.05 meaning NO shortwave" (gh) This is more of a "status-quo" than an extension. The Director General is the one who set the March 31st date. This must first be ratified by the IBA Board of Governors. There is no IBA Board of Governors at the moment, so the decision was never made final. Hence the extension (Doni Rosenzweig, DXLD)

"Subject to the IBA governing plenum deciding to continue shortwave transmission after June 30, 2005": English to Eu/NAm, u.o.s.: 0330-0345 11605 (7545 from Sept) 9345, AuAs/SAm 17600; 0930-0945 15640 17535; 1730-1745 9345 15640; 1900-1925 11605 15640, Af 15615.

Hebrew / Reshet Bet: 0400-0500 9345, 0500-0930 17535, 1030-1400 17535, 2000-2100 15640, 2100-2300 11585, 2300-0330 9345 (via Doni Rosenzweig) Will this schedule cease end of June or end of October? (George Poppin, official IBA monitor to Moshe Oren, Bezeq) Hi George, Hope it will be

until October and more (Oren to Poppin)

ITALY Radio Mi Amigo, the ultimate free radio station, now broadcasts every Saturday between 0800 and 1500 on 15725 (Neil Gates, Radio Mi Amigo, via Swopan Chakroborty, DXLD) That's on IRRS, 20 kW, presumably actually Italy, now that WRMI has left 15725 (gh)

LAOS [non] Hmong Lao Radio shifted to Sat 1200 and Sun 1300, both on new 11785 via WHRI South Carolina. Note that other days of the week at same times, 15285 is in use (gh)

LATVIA RTI, Radio Tatra International from Poprad, Slovakia, on FM and webcast <http://www.rti.fm> première April 9-10, Sat 1730-2300 & Sun 1800-2300 on 9290 (Bernd Trutenau, Lithuania, DXLD) Unclear whether this SW schedule would continue. This is another project of Eric Wiltsher, following offshoremusicradio.com (gh) RTI says that reception reports are not wanted, and will not be verified. "We really can't have people sitting there sending out QSL cards when we have a commercial radio station to run," RTI says (DXing.info) Knows how to win friends.

LIBYA [non] LJB A-05 via TDF 500 kW Issoudun, France, in Arabic with azimuths:

1000-1400 21695 140
1100-1230 15610 204
1100-1230 17695 185
1100-1500 21675 153
1600-1800 15660 204
1600-1800 17695 185
1700-1800 17880 153
1700-1900 15615 140
1800-1900 11615 204
1800-1900 15660 185
1800-2000 15205 153
1900-2030 11715 140
2000-2130 11635 153
(Observer, Bulgaria)

MALDIVES ISLANDS [non] Minivan Radio, via Radio Miami International via Jülich, Germany, A-05: 1600-1700 daily on 12015 (via Alokesh Gupta, DXLD)

MÉXICO We hope that XEYU, Radio UNAM will be back on the air by the end of May with 10 kW on 9600 (Julían Santiago Díez de Bonilla, Radio Mil, via Manuel Méndez, Spain, DXLD)

Re April MT, DRM on R. Educación, 25620: Glenn, The 12 second fading periodicity is interesting as this is 10 times the duration of what is termed the multiplex superframe, which has a duration of 1.2 seconds. The superframe is made of 3 frames of 400 ms duration. The symptoms you describe may be a function of applying energy dispersal algorithms to the data stream or it could also be a function of the audio being encoded. I am used to watching the DRM waveform on a spectrum analyser display so I have never experienced the phenomena you describe. I have seen the DRM spectrum become lopsided on many occasions before returning to the more familiar flat-top spectrum. (Kevin Ryan, <http://www.radioeng.co.uk>)

NETHERLANDS ANTILLES RN's A-05 transmission schedule shows these new DW relays now that Antigua is off, on some familiar frequencies but now via Bonaire (rather than French Guiana), with azimuths:

2200-2358 15410 ENAm 350
0000-0158 11955 ENAm 350
0200-0400 9735 CNAm 320
0400-0458 9735 WNAm 290
0500-0600 9735 CNAm 320
(Glenn Hauser, World Of Radio)

NEW ZEALAND RNZL tentative schedule for DRM testing starting May 1; each could be on 35 or 325 degree antenna: 0700-1900 7145, 1845-2000 9615, 1945-2100 11675, 2045-0500 13730, 0445-0700 9615 (BC-DX) Notice they, too, insist on using in-band frequencies for DRM! Buzz, buzz (gh)

PAKISTAN PBC A-05 schedule, English: 1600-1615 ME/NWaf 11570 15100, E/SEaf 11850 15725; Urdu 0800-1104 opens and closes with English news, WEu 17835, E&SEaf 15100. Assami [which used to be partly in English; can anyone still confirm?] SAs 0045-0115 9340 11565. Some odd frequencies appear also: 17484 at 1200-1245 Bengali, 1245-1315 Nepali; 9324 at 1715-1800 Irani, 1800-1900 Urdu [via Alokesh Gupta, DXLD] These 100 kW Rawat (Islamabad) transmitters do deviate at times, but can't confirm here. Internal SW service schedule adds English news on 7395 at 0800-0810, 1100-1104; *Current Affairs* service [partly English] on 5080 at 0200-0400 and 1300-1800. And note unusual frequency 6780 for Balti and Sheena news at 1350-1428 (Noel Green, UK, DXLD)

PERÚ I.D.L. Radio heard at 0100 on 9499.96; what is this? (Björn Malm, Ecuador, DXLD) Your clip had a clue it is Perú, so likely R. Madre de Dios, Puerto Maldonado, relaying something or with a new name (gh) Ideele Radio; See <http://www.ideeleradio.org.pe> – a program produced in Lima, relayed by lots of stations (Henrik Klemetz, Sweden, HCDX) Listening further, also heard R. Madre de Dios ID (Malm)

[non] On the WRMI schedule, UT Sunday 0030-0045 on 9955 is *Radio Fuerza Democrática*, and it should still be on the air for a long time, since elections aren't until next year. It may expand to a half-hour at some point. They are going to be doing a series of interviews with all of the Peruvian presidential candidates – not just the *Fuerza Democrática* candidate (Jeff White, WRMI, DXLD)

SOMALIA [non] A new target station was added to TDP as in <http://www.airtime.be/schedule.html> – Radio Horyaal, 1730-1800 on 12140, Sat thru Thu in Somali. Website <http://www.halganews.com> says 12130 (Bernd Trutenau, Lithuania, DXLD) Heard on 12140 toward end of B-04 (Mike Barraclough, UK, Scott Barbour, NH, *ibid.*) For A-05 switched to 12130 (Jose Miguel Romero, Spain, *Noticias DX*) Its own website is <http://www.horyaal.net> with e-mail address radio@horyaal.net (Trutenau, DXLD) Via Samara, Russia, 240 kW at 188 degrees (Wolfgang Büschel, *ibid.*) 12130, *1730 just after hearing V. of Oromo Liberation closing 1730* on 12120 with even better signal. Website of R. Horyaal reported that their reporter Ahmed Saleban Dhuhul had been arrested in Hargeisa, and denied it is a clandestine (Finn Krone, Denmark, DSWCI DX Window)

Shortwave Broadcasting

SOUTH AFRICA Channel Africa A-05 English, all to parts of Africa, with kW:

0300-0355 6160 500
0300-0500 3345 100
0500-0555 9685 500
0500-0800 7240 100
0600-0655 15440 250
1000-1200 11825 100
1400-1600 11825 100
1500-1555 17770 500
1700-1755 15235 500
2000-2200 3345 100

(Kathy Otto, Sentech Ltd via Alokesh Gupta, DXLD)

SPAIN English from REE at 0000 was heard on its summer frequency 15385 the first day of A-05, but gone halfway through the hour, and not heard the following several days (Rick Barton, AZ, DXLD) They registered both 15385 and 6055. Nothing on the latter, and 15385 dominated here by VOA Mandarin via Philippines, and Chinese jamming (gh, OK) 15385 again heard a week into A-05 (Daniel Sampson, WI, *ibid.*) Also VG here in New Zealand (Philip van de Paverd, *ibid.*) The Chinese interference was a problem as far east as CT (Bob Thomas, *ibid.*) Didn't we say this in previous summers? 15385 is too high for this service, too subject to lowered MUFs; should use 9 or 11 MHz, or better yet, Costa Rica relay (gh) English to Eu/Af same as last summer, weekdays 2000, Saturdays 2105, on 9570, 15290, Sundays 2100 on 9570, 9840 (Mike Barraclough, UK, DXLD)

REE's *Crónica en Lengua Cooficiales* [Catalan, Basque, Galician] is now at 1240-1257 M-F on 21700, 21610, 21570, 21540, 15585, 15170, 13720, 11815, 9765; Sample of Sephardic language and mp3 files are at <http://www.rtrve.es/rtrve/ree/pnsefar/sefardi.htm> - "La Emision "SEFARAD" en lingua Djudeo-esparyola, es un programa aparejado por Matilda i Rajel Barnatan, ke destaca la fruchiguozza erensia ke guadraron los djudios de Espanya. . ." with the NAM half-hour at 0415 UT Tuesdays moved to 9650 (gh)

SUDAN [and non?] E-mail reply from Peter Stover of R. Peace, originally on 4750, says testing on 5895 at 0300-0330 and 1700-1730; not clear from where (Christer Brunström, Sweden, SW Bulletin) Then confirmed on 5895 between 1700 and 1730, starting with religion in English until 1715, strong carrier but undermodulated. Africa Messenger pdf publication at <http://www.persecutionproject.org> reported an upgrade to 5 kW and a rhombic antenna (Jari Savolainen, Finland, World Of Radio) Another issue claims it broadcasts in 7 indigenous languages as Sudan's first Christian station, countering radical Islam (gh) Upgrade to 5 kW could explain substantial increase in signal strength on 4750 I noted in Nairobi in January and February, compared to what was observed in 2004 (Chris Greenway, DXLD)

SWEDEN [and non] We have to renegotiate our contract with Teracom, who own the transmitters we use in Sweden, in the next few months; we have the option of going elsewhere such as to VT Merlin for SW transmission (George Wood, Radio Sweden, on VOA Talk to America)

SYRIA R. Damascus, Spanish found by chance at 2354 on new unlisted 9330 (José Miguel Romero, Spain, Noticias DX) Fair here at 0010 by QRM in English, tentatively WBCQ (Rubén Guillermo Margenot, Conexión Digital) Had been scheduled 2320-2430 on 12085 (WRTH 2005) Could not hear Syria here even on USB as WBCQ is LSB only, but in areas where they clash, Damascus ought to stay on USB only (gh) Syria also on 9330 for German 1805-1905 (Rumen Pankov, Bulgaria, BC-DX) And 1605 in Turkish, then Russian (Noel Green, UK, *ibid.*)

[non] R Free Syria, A-05 via Radio Miami International via Jülich, Germany: Sundays 1800-1859 on 13650 (via Alokesh Gupta, DXLD)

THAILAND [and non] R. Thailand A-05 in English via IBB Udon u.o.s.: 0530-0600 17690 Eu, 1230-1300 9600 SEAs/Au, 1400-1430 9830 SEAs/Au, 1900-2000 7155 Eu, 2030-2045 9680 Eu, 0000-0030 9570 Af, 0030-0100 5890 Carib (Greenville), 0300-0330 5890 WNA (Delano) (Aaron Zawitzky, DX Listening Digest) The trouble is, the second half of a one-hour news-magazine airs at 0030 and the first half at 0300, full of promotional considerations (Ted Schuerzinger, NY, swprograms)

TURKEY VOT got a new director, Miss Engin Asena, who is Turkish, and formerly chief of German section. She has been to EDXC conferences, is very fond of international radio, hopes to develop contacts with DXers around world. English at 03 on 6140 7270 to NAM, also good here (Luigi Cobisi, Italy, European Perspective, HCJB DX Partyline)

UGANDA [non] After several delays, R. Rhino International resumed April 11 after a break of more than a month, M-F 1500-1530 on 17870 via Germany; due to poor propagation not audible here in OK at first (gh) Confirmed April 13, poor but audible here (Andy Sennitt, Netherlands, DXLD) Better here (Alan Pennington and Noel Green, UK, *ibid.*)

U A E Emirates Radio, Dubai seems to have ceased using SW since the start of A-05 period on Mar 271 (Noel Green and Anker Petersen, DSWCI DX Window) I had a heard an open carrier March 29 at 1430 on 21605, last gasp? (gh, OK)

U K [and non] What's left of BBCWS for the C & S America, following the drastic cuts for A-05, the closest they can get to NAM on SW, with Antigua dormant: French Guiana at 295 degrees across the middle of Mexico is best: 1000-1100 6195, 1100-1300 11865, 1300-1400 15190, 2100-2200 15390, 2200-0100 5975, and at 255 degrees, 0200-0300 5975. Via WYFR: 1200-1300 on 9605 to CA, poor here with FE interference. Bonaire: 1200-1300 15190, 2100-2200 M-F 11675. At 0200-0300 there is also 12095 from UK and 9825 from Ascension, and 0300-0400 5975 from Delano. These include the Caribbean cut-aways during the 1100, 1200 and 2100 hours. It took more than a month to fix annoying audio dropouts on the French Guiana transmitter.

There are still broadcasts to Europe, Mideast, Africa and Asia we can get if we're lucky, but usually not with signal strength for easy portable listening. For example, the relay in Thailand aims 25 degrees toward EAs, and that carries on

to NAM when the MUF coöperate: 1000-1400 on 17760, 0000-0100 on 17655, not all in English (gh)

U S A [and non] The Broadcasting Board of Governors will outsource the overnight shift for the VOA English newsroom to Hong Kong. VOA Director David Jackson supported this because it would save money. We question whether English news broadcasts by VOA should be written by non-Americans in a foreign country (AFGE Local 1812) Every day between midnight and 7 a.m., ET, the Voice's new state-of-the-art multimedia newsroom will be closed. The news will be "contracted out" to a team of eight editors and writers (reportedly Americans, British and Australians) in Hong Kong, Peoples Republic of China. Some sources project cost savings at about \$300,000 annually, in a VOA budget of approximately \$168 million. If implemented, the proposed schedule will mark the first time since at least the early 1950s that the VOA HQ newsroom has gone dark.

Relocating VOA central news operations in the PRC for nearly a third of each day poses significant risks. In the event of another Tiananmen uprising or a Beijing assault on Taiwan, the Chinese regime could shut down VOA's worldwide news service in a flash, either by cutting communications or by expelling staff. The proposed outsourcing of news services to PRC-based contractors appears to be the latest in a series of measures aimed at dismantling the Voice and its global reach. Since 1999, the U.S. Broadcasting Board of Governors, which oversees VOA, has cut the number of its worldwide SW frequencies in English from 354 to 52. VOA English broadcasts can no longer be heard in Latin America or Europe (East and West) and are barely audible in the Middle East (Alan Heil via John Figliozi)

What will be written if the Chinese invade Taiwan? Will there be a story saying, "One million brave Chinese volunteers, responding to desperate pleas for help from their cousins in Taipei, crossed the Taiwan Strait this morning?" (Al Kamen, via Bill Westenhaver) Got the Hong Kong idea from CNN? (gh)

While in the B-season, 15580 was from Greenville, providing a good signal over most of North America for VOA English in the afternoon, in the A-season this frequency moved to Botswana, and Greenville to 15445 at 1900-2200; second choice, or first choice in the Greenville skip zone, is Morocco on 15410 at 1700-2200. VOA has also invaded an aeronautical band, cozying up to Iran on 15085? (gh) 15090 from Kuwait to Afghanistan at 0930-1830, RFA and VOA alternating Pashto and Dari, 250 kW, 70 degrees (Observer, Bulgaria)

RFE/RL unveiled its new logo at the end of March, replacing the Liberty Bell in blue - a silver torch with a burnt-orange flame, symbolizing the fight for democracy (RFE/RL via AIB) Looks all orange to me (gh)

Transformation Media International, in Albany, OR, has applied to the FCC for a construction permit for a SW station near Lebanon, Oregon, four 50-kilowatt P.E.P. reduced carrier USB transmitters, three rhombic antennas toward NE Asia, Caribbean, CA, northern SAM; and a log periodic to C&E Canada. It intends to offer a variety of programming such as news, religious teaching, educational, comedy, and music, in English, Spanish, French, Russian, Japanese, Korean and Mandarin. Michelle Brosnan, operations manager, attended the February HFCC-ASBU Conference in Mexico City to learn more about international broadcasting and SW frequency planning (NASB Newsletter) Behind TMI is Bob Lund. It's primarily religious (Jeff White, FL, DXLD)

Many of you knew our chief engineer at WRMI, Kiko Espinosa. He had been very ill for a number of months with inoperable cancer. I am sorry to report that on April 6 Kiko passed away. Kiko was one of our partners at WRMI, and had been in charge of the engineering aspects of the station ever since we went on the air 11 years ago. He almost single-handedly built the transmitter site, maintained it, kept the transmitters on the air and fixed anything that went wrong over the years. We know he had a great sense of accomplishment when WRMI went on the air as a commercial shortwave station in 1994 (Jeff White, WRMI, DXLD)

KVOH was monitored running reduced-carrier, although not intentionally. On 17775 at 1607 UT March 28, a screaming preacher in Spanish made the S-meter jump with modulation; quite distorted, not enough carrier like WBCQ's 'compatible' SSB.

Another outlet with slightly reduced carrier was WHRA, April 5 at 1427 with the S-meter moving slightly at modulation peaks on new 15310. This was more obvious once the very strong signal was attenuated. Is this deliberate or merely a symptom of an ailing transmitter? There was also a slight squeal, à la CRI/RHC (gh)

WRNO's reactivation kept getting put off, still not on by April 15 (gh)

VENEZUELA R. Amazonas is heard on 4939.67 only in the mornings, such as 0937; no sign of it in the evenings (Adán González, Venezuela, DXLD)

WALES [non] Altho Wales Radio International coördinated a schedule for A-05, there will be no need for it: website announced that the weekly Celtic Notes was suspended from end of March, hoping to return in the autumn. A multi-week string of transmission failures by the Austrian relay, as monitored by Bernie O'Shea, may have prompted this (gh)

ZIMBABWE [and non] To combat jamming as the March 31 elections approached, SW Radio Africa had to keep changing frequencies and relay sites. Afterwards, as of mid-April, the schedule became: 1600-1800 15145 and 1800-1900 11770 via UK; 1600-1900 12145 via Samara, Russia, 3300 and 4880 via South Africa (gh) The UK frequencies were free of jamming (David Pringle-Wood, Harare, DXLD)

Meanwhile, the Mugabe government was reported about to launch its own 24-hour 'news' station on SW, New Ziana (Xinhua via Ydun Ritz) They should convert the jamming transmitters and leave SWRA alone in the battleground of ideas (gh)

Until the Next, Best of DX and 73 de Glenn!



0009 UTC on 6215

ARGENTINA: Radio Baluarte. (Tent.) Spanish. Musical ballads to announcers' chat. No discernible ID noted with poor-weak signal observed under static. (Scott Barbour, Intervale, NH) RAE 11710, 0200 (Roger Nash, Heber Springs, AR) 11710, 0030+. (Arnaldo Slaen, Buenos Aires, Argentina) Radio Continental 15820 LSB, 2109-2120+ (Harold Frodge, Midland, MI) 2355-008 Spanish. (Barbour, NH)

0100 UTC on 4052.5

GUATEMALA: Radio Verdad. Spanish. Sign-on ID and announcer's urging listeners to write to religious program. (Fernando Garcia, Baltimore, MD) 0400-0405. (Joe Wood, Greenback, TN) 0403-0417+ (Frodge, MI) Guatemala's Radio Cultural Coatán 4780, 0249-0320*. (Frodge, MI)

0120 UTC on 5910

UKRAINE: Radio Ukraine Int'l. Heavy accented male's English reading of station reception reports. SIO 3+43 with no audio interference detected; 5840, 2206-2212+; 5910, 0131-0136+. (Frodge, MI) 5840, 2248-2300. (Duane Hadley, Bristol, TN)

0230 UTC on 9660

FRENCH GUIANA: Radio Japan relay. Portuguese service to South America including drama and operas. (Garcia, MD) Radio France-French Guiana relay 17630 at 1820. (Alvin Mirabal, Puerto Rico)

0330 UTC on 4976

UGANDA: Radio. "You are tuned to Radio Uganda," followed by announcer's English news text. Signal fair with intermittent signal fading. (Sam Wright, Biloxi, MS) Frequency monitored at 0430-0445 with weak English service and regional music. (Frank Hillton, Charleston, SC)

0428 UTC on 3975

HUNGARY: Radio Budapest. Multilingual IDs with brief piano interludes. Followed by Spanish programming at 0430. (Nick Kucij, VT)

0500 UTC on 6195

UK: BBC. Station identifications to featured segments. (Daniel Mol, Jr. N3RUM, Eynon, PA) BBC Antigua relay 11675, 2110. (Lou Rossetti N1PUX, Arlington, MA) 13660, 1711. (Mirabal, PR)

0912 UTC on 3173

PERU: Radio Municipal. Spanish folkloric programming to regional briefs. Peruvian's audible in Spanish; Radio Atlantida 4790, 0955; Radio Victoria 6021, 1030; Radio Oriente 6188, 1045; (Mirabal, PR) Radio Union 6114.86, 0857-0905 (Slaen, ARG) Radio Maranon 4835, 1057-1108. (Barbour, NH)

0931 UTC on 3279

ECUADOR: La Voz del Napo. Announcer's Spanish family greetings and salutations. (Mirabal, PR) Ecuador's HD210A, 3810 at 1005. (Garcia, MD) Radio Quito 4919, 0458-0525 Spanish. (Tom Banks, Dallas, TX)

0932 UTC on 3375

BRAZIL: Radio Educadora de Guajar Mirim. Portuguese text from male program host and Braz pops. ID and local ads at 0949. Very good signal. Brazilians in Portuguese; Radio Caiara 4785, 1045-1052. (Rich D'Angelo, Wyomissing, PA/NASWA Flash Sheet) Radio Nacional da Amazonia 11780, 0600-0610. (David Weronka, Benson, NC) Radio Clube do Para 4885, 0457-0509. (Wood, TN)

1128 UTC on 4790

INDONESIA: (Celebes) RRI-Makassar. Indonesian. Continuous music ballads and pop music slipping under increasing "sweeper" interference. Poor/fair copy. Indo's audible: RRI-Serui 4604.97, 1153-1202; RRI-Makassar 4749.98, 1250-1300; RRI-Palangkaraya 3325, 1250-1300. (Barbour, NH) RRI-Serui 4605, 1150-1210. (Hillton, SC)

1130 UTC on 4460

CHINA: CPBS. Military music at tune-in. Announcer's comments, ID and items about China, presuming to be news briefs. (Banks, TX) China Radio Int'l 9700, 1422-1430+. (Frodge, MI) Xinjiang PBS (tent) 4980, 0104-0135. (D'Angelo, PA)

1403 UTC on 7240

AUSTRALIA: Radio. Asian news to ID at 1405 and RA Sports Desk to "this is your Asian-Pacific Network, Radio Australia." (Frodge, MI) VL8A-Alice Springs 2310, 1042-1102. (Barbour, NH) 1102-1125 // VL8T- Tennant Creek; VL8K-Katherine (poor). (D'Angelo, PA)

1456 UTC on 11690

JORDAN: Radio. Pop vocals to two time pips at 1500. English news-cast to "and that's the end of the news from Radio Jordan." Music program, Listeners Choice from 1504. (D'Angelo, PA) 11690, 1538 Radio Jordan ID plus "96.3 FM". (Frodge, MI)

1500 UTC on 21570

SPAIN: REE: Spanish ID into program Spaniards at Sea and national news. Vocals and literature readings for transmission targeted for Spanish fishing fleet. Closedown at 1557. (Garcia, MD; Weronka, NC; Wood, TN)

1625 UTC at 13675

AUSTRIA: RAI. Report on national education and labor in Austria. (Fraser, ME)

1800 UTC on 15240

MOROCCO: Voice of America relay. World news to weather report. (Rossetti, MA) Additional relays; VOA-Botswana relay 4930, 0328-0340. (Barbour, NH) Radio Taiwan via Okeechobee, Florida 9355, 2210. (Nash, AR)

1854 UTC on 6070

CANADA: CFRX. The Phil Edmonston Show to auto fix it call-in segments. News and ads to The Real Estate Show. Many IDs and "News-Talk 1010 CFRB Toronto." Better than // 1010 kHz AM. (Frodge, MI) RCI 9810 // 6190, 0200-0230. (Nash, AR)

2000 UTC on 7285

ALBANIA: China Radio Int'l relay. World and national news coverage on China. (Fraser, ME) 6020, 0135-0154+; Albania's Radio Tirana 7120, 2245-2258*. (Frodge, MI)

2000 UTC on 15315

NETHERLANDS ANTILLES: Radio Netherlands relay. Vox Humana on the art of war // 17725. (Fraser, ME) Various Radio Netherlands relay sites monitored on 11655 at 1900. (Rossetti, MA)

2025 UTC on 9535

THAILAND: Radio Thailand. Lady's slow-speed English text to time check, chimes signal and ID at 2030. National news SIO 242 // 9680. (Frodge, MI) 5890, 0030. (Rossetti, MA) Thailand's Bangkok Meteorological Service 6765 USB, 0928-0945+. (Slaen, ARG)

2110 UTC on 7300

RUSSIA: Voice of. News item on North Korea allows Russian scientists animal study. (Fraser, ME) VOR 5900, 0200. (Garcia, MD) China Radio Int'l Russian relay 7170 at 2201. (Frodge, MI)

2159 UTC on 6926

PIRATE: WKIL. First logging of station with blues and jazz tunes. Mostly unreadable but improved to hear "This is Jack Black transmitting from a remote location," plus ID as "WKIL". Tunes from Led Zeppelin and Hendrix's Voodoo Chile. Poor reception at best. (Wood, TN)

2245 UTC on 5800

BULGARIA: Radio. Answering Your Letters segment // 7500. (Fraser, ME) 9700, 0030-0035. (Weronka, NC)

2258 UTC on 7345

CZECH REP: Radio Prague. Sign-on announcements to French service ID and world newscast. (Wood, TN)

2300 UTC on 21740

AUSTRALIA: Radio. World newscasts good signal quality. (Fraser, ME) HCJB Australia 15390, 1441-1457+ with Harvest Radio program. (Frodge, MI)

2315 UTC on 7115

EGYPT: Radio Cairo. News on Iraq presented by announcer duo. Fair to good signal with amateur radio interference. (Fraser, ME) 7260, 0200-0230. (Nash, AR) 6970, 0042-0050 Spanish // 9415 (good) 9415 (good) 11755 (poor). (Barbour, NH) Three interval tones at 0200 on 7260. Spanish ID with freqs and program promo // 9415. (Garcia, MD)

2345 UTC 11800

ITALY: RAI. Italian service ID to non-stop classical music program. (Fraser, ME) 15320, 1750+. (Mirabal, PR)

2350 UTC on 5960

TURKEY: Voice of. Good signal quality for Turkish Sports in the Republican Era. (Fraser, ME; Nash, AR) 15350, 1512+. (Wood, TN)

Thanks to our contributors – Have you sent in YOUR logs?
Send to Gayle Van Horn, c/o Monitoring Times
(or e-mail gaylevanhorn@monitoringtimes.com)
English broadcast unless otherwise noted.

The Shrinking BBC and VOA

"Life is what happens to you while you're busy making other plans."

— John Lennon.

At the close of May's missive, I confidently stated that this month's column would deal with a review of U.S. international broadcasters and their programming. Oh, how wrong I was!

We do try (and how we try!) to be current here. In the time since I wrote those words, two events have conspired to draw our more immediate attention above the topic that we honestly intended to cover this month. Those topics are: (1) the continuing decline of the BBC World Service on shortwave; and (2) the incredible, further shrinking of the Voice of America.

❖ The BBC as DX Catch

I think it's safe to say that during the halcyon days of shortwave none of us would have anticipated a time when the BBC World Service would become something of a DX catch for North American listeners. Yet that is the direction in which things are going, as the BBC again surprised us with a further reduction in shortwave use overall, as well as another downgrade of its HF service to the Americas — that is, Central and South America and the Caribbean (service to North America ended in July 2001). I say "surprised" because there was virtually no advance warning given — just three weeks. Consequently, the schedules that appeared in the April issue of this magazine did not reflect those changes.

So, on shortwave at least, the Americas stream of the BBC World Service can be heard only from 1000-1400, 2100-0100 and 0200-0400 UT. Furthermore, those broadcasts no longer emanate from the Caribbean island of Antigua. The BBC and Deutsche Welle (DW), which jointly owned and operated this venerable relay facility, decided to shut it down as a cost-cutting move. The Radio France Internationale-owned facility in Montsinery, French Guiana, is now the source of most of the World Service transmissions to the

Americas, with other relays coming by way of Delano (California), Okeechobee (Florida), Ascension Island in the mid Atlantic, directly from Skelton in the UK (see chart), and a previously unused site for the BBC — the Radio Netherlands relay on Bonaire.

My experience thus far is that the BBC is harder to hear on shortwave than it's ever been. Of course, I live in upstate New York. Listeners located in the southern half of the U.S. may have noted virtually no difference, save for the reduction in hours.

Chart 1: BBCWS Americas Stream on Shortwave

Freq kHz	UTC	Target	Relay Site
6195	1000-1100	Caribbean	Montsinery
11865	1100-1300	Caribbean	Montsinery
9605	1200-1300	Central America	Okeechobee
15190	1200-1300	South America	Bonaire
	1300-1400	Caribbean	Montsinery
11675	2100-2130	Caribbean(M-F only)	Bonaire
15390	2100-2200	Caribbean	Montsinery
5975	2200-0100	Caribbean	Montsinery
	0200-0300	South America	Montsinery
	0300-0400	Central America	Delano
9825	0200-0300	South America	Ascension
12095	0200-0300	South America	Skelton

N.B. No transmission 0100-0200.

Source: BBC World Service

The full Americas stream 24/7 is available to subscribers of XM satellite radio. And, of course as the BBC often reminds us, their programs are available 24/7 via the internet and by subscription to Sirius satellite radio, which carries a stream specifically contracted for by Public Radio International. PRI, in turn, offers this stream, which is heavily weighted toward news, to public radio stations around the country, and many affiliates do relay the BBC overnight and much more sporadically

Chart 2: Other BBCWS Streams & Frequencies

Monitored Regularly at Halfmoon, NY

Freq kHz	UTC	Relay Station	Stream
21470	1400-1900	Ascension	East/Southern African
12095	1600-1900	Wooferton	European
	1900-2100	Ascension	East/Southern African
9410	1800-2100	Cyprus	European
17830	1800-2100	Ascension	West/Central African
15400	1800-2300	Ascension	West/Central African
6195	0400-0600	Rampisham	European
7160	0400-0600	Ascension	West/Central African

Also check 9410 from time to time.

during the day.

For those who are not inclined to pay over \$130 a year for satellite radio or who don't find the internet a comfortable alternative to traditional radio, the BBC has, indeed, become something of a challenge to hear, especially around the clock. With no shortwave transmissions specifically targeted to North America, experiences with frequencies targeting other regions will tend to vary quite noticeably from place to place. However, in the spirit of mutual assistance to fellow shortwave listeners in similar distress, chart 2 shows what frequencies (other than those for the Americas stream in Chart 1) are proving generally useful for my location in Halfmoon, NY (150 miles due north of New York City).

Results will be enhanced either through use of a more sensitive portable or the use of an external antenna. The latter can be something as simple as a length of copper wire (insulated or not) with one (exposed) end wrapped around the retracted whip antenna. Experiment a little, but don't be surprised if you find that the external is now a necessity for you to hear some BBC broadcasts on shortwave in reasonable quality.

❖ What about DRM?

As we enter a fourth year of Digital Radio Mondiale (DRM) broadcasts, we continue to await the introduction of a reasonably sized and priced "all in one" receiver capable of decoding these broadcasts "right out of the box." Although the BBC World Service broadcasts to North America two hours a day in DRM mode (see chart 3), one is reminded of the old "If a tree falls in a forest but no one hears it, does it make a sound?" philosophical query. Apparently, the World Service feels, at this point, that its money is better put to use broadcasting two hours a day to North America in a mode which holds promise but virtually no one can receive, as opposed to a tried and true method that admittedly might be in a slow decline but does definitely have listeners.

After more than one false start, the DRM consortium now says that "off the shelf" affordable

Chart 3: BBCWS to North America Via DRM

UTC	Freq kHz	Transmitter	Beam	Power
2300-0000	9800	Sackville	268	70kW
0300-0400	11955	Sackville	268	70kW

Source: DRM Consortium

radios will be available for purchase by fall 2005 in time for the huge Berlin consumer electronics show, the IFA. The initial market, according to VT Communications' February *DRM Newsletter*, will be Germany, France and the Benelux countries. Some observed trends do support this statement, as there is a growing cluster of DRM broadcasting activity targeting this region. Hopefully, North America will not be too far behind.

❖ This is the VOA in Hong Kong

On April 11, the Voice of America's Director David Jackson made an announcement that on the surface would appear to simply reflect new realities in a globalized, 24 hour business world. He announced that, for seven hours a day – midnight to 7 a.m. Washington time – primary news operations are to be transferred to Hong Kong.

A statement from the VOA's Office of External Affairs described the move as a step to expand the VOA's presence in Asia, stating the obvious point that the region is an increasingly important one for the broadcaster. "We believe that the move will position VOA to offer better and faster-reacting coverage of news from Hong Kong, and the rest of East Asia. The move will also include adding internet staff in Hong Kong who will enable VOA to update its web presence 24 hours a day, something that is sorely needed."

As announced, the plan is to hire three editors and five writers "as contractors" in Hong Kong to handle the news operations there. "Stories produced in Hong Kong will be edited by full time staff currently based there and also overseen and vetted by their counterparts who will remain on the midnight shift in Washington," where final editorial responsibility will remain.

The statement stresses that the VOA's brand new state of the art multimedia newsroom in Washington "is not exactly going dark" during those overnight hours, though the employees previously assigned there for news operations during that time will be moved to other day and evening shifts.

It's also pointed out that the VOA has long had a bureau in Hong Kong, a city that "has a skilled local English-speaking workforce of journalists" and, like other broadcasters, has used foreign stringers around the world for many years. "Although this shift will result in a small savings, that is not the main point of the move. It is rather to extend and enhance our presence in Asia, assure quality coverage during Washington's overnight hours, and achieve true 24-hour web coverage," the statement concludes.

So, What Could Be Wrong Here?

Maybe nothing; but, on the other hand, maybe there are grounds for suspicion. For one thing, prominent and trusted individuals like Alan Heil, a former VOA deputy director and author of "The Voice of America, A History," and Sanford Unger, who recently served as VOA Director after a career in public and commercial broadcasting, are expressing misgivings.

For another, since 1999 the U.S. Broadcasting Board of Governors, which oversees VOA, has cut the number of its worldwide shortwave frequencies in English from 354 to 52. VOA English broadcasts can no longer be heard in Latin America or Europe (East and West) and are barely audible in the Middle East. And staff of the BBG have gone on record as stating the rather incredible opinion that English, the universal language of trade and commerce, is now largely irrelevant to U.S. international broadcasting and public diplomacy interests.

It is that last point that Unger highlighted as particularly misguided in an interview on NPR's *All Things Considered* on April 16. VOA has reduced availability of its news and other fare in English to only 16 hours a day at the same time as broadcasters like the BBC, DW and China Radio International are offering around-the-clock coverage.

Heil cites recent history, warning that relocating VOA central news operations in what remains, after all, the Peoples' Republic of China (PRC) for nearly a third of each day poses significant risks. In the event of another Tiananmen uprising or a Beijing assault on Taiwan, the Chinese regime could shut down in a flash VOA's worldwide news service, which still serves around 100 million listeners weekly and hundreds of FM and TV affiliates around the world – either by cutting communications or by expelling staff. In June 1989, the China expelled two VOA Beijing correspondents after the Tiananmen massacre and – to this day – China vigorously jams VOA broadcasts into China. In that light, this hardly seems a prudent move, especially without some robust back-up plans in place.

As an isolated event, this move probably would not merit more than a routine level of scrutiny. However, when seen in the context of a series of actions taken by the BBG over the last five years or so, the proposed outsourcing of news services to PRC-based contractors appears to be the latest in a series of measures aimed at dismantling the VOA and its global reach. It further calls into question the commitment of the BBG to the journalistic principles enunciated in the VOA Charter, which carry the force of law; but which do not legally apply to the growing panoply of surrogate broadcasters overseen by the BBG.

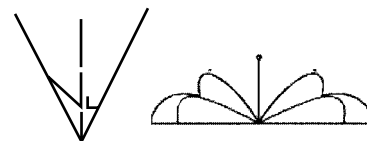
That suspicion is reinforced when the VOA Office of External Affairs cites the unpopularity of the overnight shift with staff, the obstacle that an overnight shift presents to

recruitment efforts, and the already-in-place communications connectivity between Washington and Hong Kong as further supporting rationale. As true as these points might be, they hardly serve as convincing arguments for virtually shutting down VOA headquarters and its central newsroom for seven hours a day. Neither does redirected cost savings of \$300,000 in a \$168 million budget.

Why Should You Care?

Well, you pay the taxes and these moves are all being made in your name. You're also a shortwave listener, more aware than most of international affairs and the role of broadcasting in it, and uniquely placed to offer informed perspective on the subject. The VOA is your international broadcaster and the only one strictly governed under force of law by principles for which some of your relatives and friends literally fought – and, in some cases, died. Things like truth, accuracy and objectivity in journalism.

Isn't it time your voice was heard – in online listener forums, in Washington by your senators and congressional representative, and in the letters section of this magazine – about all this?



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Most Wanted QSL List

Here's an idea you can try to bring those tough replies closer to a resolution. After a number of attempts to verify a tough one, you're an expert at what doesn't work and the more desirable the QSL becomes!

Take the especially tough ones, and create a "Most Wanted" list to work from, usually around ten stations. Place the list near your receiver or a bulletin board at your listening post. By placing the list where it is visible, you're likely to be reminded to think about those stations more frequently. As a result, you may come up with new approaches to try or send follow-ups more often. Keep up to date on QSL policies here in *Monitoring Times* or club bulletins. Both represent the current trends and "what's working."

This "most-wanted" approach is very effective. Collectors tell

me it makes them more determined to succeed and that alone can bring positive results. When you do verify one from your list, don't replace it with another station. Just scratch it off and keep working down your list. Watching the "most wanted" stations go down in number is more encouraging than retaining a full list of ten or twelve stations. When the number is down to three or four you can replenish the list and begin again.

Keep an eye on those stations who haven't answered with a tracking sheet. Here you'll know what techniques have been tried on the station and when your last attempt was made. You may discover from the tracking sheet some stations that require their own page of reporting history!

Let us know how your Most Wanted QSL List worked. We always appreciate feedback from our contributors.

ARMENIA

Voice of Armenia, 9960 kHz. Full data QSL and letter signed by Armen Amirian-Station Director, plus sticker. Received in 145 days for an English report and two IRCs. Station address: Alex Manoogian St. 5, Yerevan 375025, Republic of Armenia. (Ben Loveless, Bloomfield Hills, MI)

CHINA

Voice of Jinling, 5860 kHz. Full data scenery card with Chinese text, unsigned. Received in 25 days for an English report and one US dollar. Station address: P.O. Box 268, Nanjing, Jiangsu 210002, China. (Scott R. Barbour, Intervale, NH)

MEDIUM WAVE

Turks and Caicos Island. Radio Vision Cristiana 530 kHz AM. Full data verification form letter signed by Peter Polanco-Chief Engineer. Received in 26 days for an AM report, address label (used) and one US dollar. Station address: P.O. Box 2908, Paterson, NJ 07509-2908. (Bill Wilkins, Springfield, MO)

JCA 930 kHz AM. No data letter signed by Lynda Johnson, plus two window stickers and program schedule. Letter confirms station format as Southern Gospel music, talk and religion, with slogan as The Light. Received for an AM report. Station address: 4207-98 Street, Suite 204, Edmonton AB, Canada T6E 5R7. (Patrick Griffith,

Westminister, CO)

KASL, 1080 kHz AM. Handwritten verification signed by Hazel Powell-Office Manager, plus station stickers. Received in seven days for AM report. Station address: 163 East 100 North, Price, UT 84501. (Patrick Martin, Seaside, OR)

KKDD, 1290 kHz AM. Second full data logo card this week, plus letter signed by Mike Escarcega-Operations Manager. Received in 21 days for an AM report and returned my QSL form letter with QSL. Station address: 2001 Iowa Avenue # 200, Riverside, CA 92507. (Martin, OR)

KOMJ, 590 kHz AM. Partial data letter on Journal Broadcast Group letterhead, signed by Paul Sjodin-Engineer. Received in ten days for an AM report, address label (not used) and one US dollar. Station address: 5030 N. 72nd Street, Omaha, NE 68134-2363. (Wilkins, MO)

KVNS, 1700 kHz AM. Full data letter on Clear Channel letterhead, signed by John Munoz-IT Manager, Engineering. Received in 38 days for an AM report and one US dollar. Station address: 901 E. Pike Blvd., Weslaco, TX 78596. (Wilkins, MO)

KWFS, 1290 kHz AM. No data Clear Channel logo note card signed by Jim-General Manager (illegible surname). Received for an AM report. Station address: 2525 Kell Blvd # 200, Wichita Falls, TX 76308. (Griffith, CO)

WFIL, 560 kHz AM. Nice QSL card signed by René Tetro-Chief Engineer. Received in 60 days for an AM report. Station address: 117 Ridge Pike, Lafayette Hill, PA 19444 Station is one of my best domestic catches heard using an emergency antenna. Philadelphia stations on medium wave are not an easy catch on the West Coast of North America. (Martin, OR)

NORTHERN MARIANAS

Radio Free Asia via Tinian, 15510 kHz. Full data Year of the Rooster card without site or signature, plus bum-

per sticker and letter signed by A.J. Janitschek. Received in 23 days for an English report. Station address: Radio Free Asia, 2025 M. Street NW, Suite 300, Washington, DC 20036. (Wilkins, MO)

PIRATE

The Crystal Ship, 6857 kHz. Full data card # B-43 signed by The Poet, plus pennant and copy of On Board the Crystal Ship interview. Received in twelve days for an email report to: cshortwave@yahoo.com. (Kraig Krist KG4LAC, Annandale, VA)

SPAIN

Radio Exterior España 595 kHz. Verification on station letterhead unsigned, plus Carnaval stickers. Received in 15 days for a Spanish report. QSL address: Programa "Españoles en la Mar," Apartado Postal 1233, Santa Cruz de Tenerife, Spain. (Dan Malloy, Everett, MA)

TAIWAN

Radio Australia relay via Taipei, 11550 kHz. Full data card of Shepparton International High Frequency transmission station, signed by Sam Johnson. Received in 180 days for a Bahasa-Indonesian report. Station address: GPO Box 9994, Melbourne, Victoria 3006, Australia. (Arnaldo Slaen, Buenos Aires, Argentina)

UAE

Adventist World Radio, 15385 kHz. Full data "AWR-VOH" card signed by A. Kaibe. Received in 79 days for an English report and one IRC. QSL states site as "Agat, Guam," although all references and schedule accompanying QSL indicate UAE. QSL was mailed from AWR-Asia/Pacific regional office in Singapore, while I mailed my report to the Voice of Hope-China, Kowloon, Hong Kong, address as requested during the program. Reports should be sent to: AWR, 39 Brendon Street, London W1H 5HD United Kingdom. (Barbour, NH)



HOW TO USE THE SHORTWAVE GUIDE

0000-0100 twhfa USA, Voice of America 5995am 6130ca 7405am 9455af
 ① ② ⑤ ③ ④ ⑥ ⑦

Convert your time to UTC.

Broadcast time on ① and time off ② are expressed in Coordinated Universal Time (UTC) – the time at the 0 meridian near Greenwich, England. To translate your local time into UTC, first convert your local time to 24-hour format, then add (during Standard Time) 5, 6, 7 or 8 hours for Eastern, Central, Mountain or Pacific Times, respectively. Eastern, Central, and Pacific Times are already converted to UTC for you at the top of each hour.

Note that all dates, as well as times, are in UTC; for example, a show which might air at 0030 UTC Sunday will be heard on Saturday evening in America (in other words, 7:30 pm Eastern, 6:30 pm Central, etc.).

Find the station you want to hear.

Look at the page which corresponds to the time you will be listening. On the top half of the page English broadcasts are listed by UTC time on ①, then alphabetically by country ③, followed by the station name ④. (If the station name is the same as the country, we don't repeat it, e.g., "Vanuatu, Radio" [Vanuatu].)

If a broadcast is not daily, the days of broadcast ⑤ will appear in the column following the time of broadcast, using the following codes:

Day Codes	
s/S	Sunday
m/M	Monday
t/T	Tuesday
w/W	Wednesday
h/H	Thursday
f/F	Friday
a/A	Saturday
D	Daily
mon/MON	monthly
occ:	occasional
DRM:	Digital Radio Mondiale

In the same column ⑤, irregular broadcasts are indicated "tent" and programming which includes languages besides English are coded "vl" (various languages).

Choose the most promising frequencies for the time, location and conditions.

The frequencies ⑥ follow to the right of the station listing; all frequencies are listed in kilohertz (kHz). Not all listed stations will be heard from your location and virtually none of them will be heard all the time on all frequencies.

Shortwave broadcast stations change some of their frequencies at least twice a year, in April and October, to adapt to seasonal conditions.

But they can also change in response to short-term conditions, interference, equipment problems, etc. Our frequency manager coordinates published station schedules with confirmations and reports from her monitoring team and MT readers to make the Shortwave Guide up-to-date as of one week before print deadline.

To help you find the most promising signal for your location, immediately following each frequency we've included information on the target area ⑦ of the broadcast. Signals beamed toward your area will generally be easier to hear than those beamed elsewhere, even though the latter will often still be audible.

Target Areas	
af:	Africa
al:	alternate frequency (occasional use only)
am:	The Americas
as:	Asia
au:	Australia
ca:	Central America
do:	domestic broadcast
eu:	Europe
irr:	irregular (Costa Rica RFPI)
me:	Middle East
na:	North America
pa:	Pacific
sa:	South America
va:	various

MT MONITORING TEAM

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Thank You ...

Additional Contributors to This Month's Shortwave Guide:

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Shortwave Broadcast Bands

kHz	Meters
2300-2495	120 meters (Note 1)
3200-3400	90 meters (Note 1)
3900-3950	75 meters (Regional band, used for broadcasting in Asia only)
3950-4000	75 meters (Regional band, used for broadcasting in Asia and Europe)
4750-4995	60 meters (Note 1)
5005-5060	60 meters (Note 1)
5730-5900	49 meter NIB (Note 2)
5900-5950	49 meter WARC-92 band (Note 3)
5950-6200	49 meters
6200-6295	49 meter NIB (Note 2)
6890-6990	41 meter NIB (Note 2)
7100-7300	41 meters (Regional band, not allocated for broadcasting in the western hemisphere) (Note 4)
7300-7350	41 meter WARC-92 band (Note 3)
7350-7600	41 meter NIB (Note 2)
9250-9400	31 meter NIB (Note 2)
9400-9500	31 meter WARC-92 band (Note 3)
9500-9900	31 meters
11500-11600	25 meter NIB (Note 2)
11600-11650	25 meter WARC-92 band (Note 3)
11650-12050	25 meters
12050-12100	25 meter WARC-92 band (Note 3)
12100-12600	25 meter NIB (Note 2)
13570-13600	22 meter WARC-92 band (Note 3)
13600-13800	22 meters
13800-13870	22 meter WARC-92 band (Note 3)
15030-15100	19 meter NIB (Note 2)
15100-15600	19 meters
15600-15800	19 meter WARC-92 band (Note 3)
17480-17550	17 meter WARC-92 band (Note 3)
17550-17900	17 meters
18900-19020	15 meter WARC-92 band (Note 3)
21450-21850	13 meters
25670-26100	11 meters

Notes

- Note 1 Tropical bands, 120/90/60 meters are for broadcast use only in designated tropical areas of the world.
- Note 2 Broadcasters can use this frequency range on a (NIB) non-interference basis only.
- Note 3 WARC-92 bands are allocated officially for use by HF broadcasting stations in 2007. They are only authorized on a non-interference basis until that date.
- Note 4 WRC-03 update. After March 29, 2009, the spectrum from 7100-7200 kHz will no longer be available for broadcast purposes and will be turned over to amateur radio operations worldwide

**GLENN HAUSER'S
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0000 UTC - 8PM EDT / 7PM CDT / 5PM PDT

0000	0015	vi	Cambodia, National Radio	11940as	
0000	0015		Japan, Radio 17825na	6145na	13650as 17810as
0000	0027		Czech Rep, Radio Prague Intl	7345na	9440na
0000	0030		Australia, Radio 15240pa	9660as 17715as	12080as 13630pa 17750pa 17775pa
0000	0030		Burma, Dem Voice of Burma	9435eu	
0000	0030		Egypt, Radio Cairo	11885na	
0000	0030	twhf	Serbia & Montenegro, Intl Radio	9580va	
0000	0030		Thailand, Radio	9570va	
0000	0030		UK, BBC World Service	3915as	5970as
			6195as 9410as	9740as	11945as 11955as
			15280as	15310as	15360as 17655as
			17790as		
0000	0030		USA, Voice of America	7215va	12140as
			15185va	15290va	17820va
0000	0045		India, All India Radio	9705as	9950as 11620as
			11645as	13605as	
0000	0057		Canada, Radio Canada Intl	9690as	
0000	0059		Spain, Radio Exterior Espana	15385na	
0000	0100		Anguilla, Caribbean Beacon	6090am	
0000	0100		Australia, ABC NT Alice Springs	2310iir	4835do
0000	0100		Australia, ABC NT Katherine	5025do	
0000	0100		Australia, ABC NT Tennant Creek	4910do	
0000	0100		Australia, HCJB	15525as	
0000	0100		Canada, CBC Northern Service	9625do	
0000	0100		Canada, CFRX Toronto ON	6070do	
0000	0100		Canada, CFVP Calgary AB	6030do	
0000	0100		Canada, CKZN St John's NF	6160do	
0000	0100		Canada, CKZU Vancouver BC	6160do	
0000	0100		Canada, Radio Canada Intl	9755am	11990am
			13710am		
0000	0100		Costa Rica, University Network	5030va	6150va
			7375va 9725va		
0000	0100		Germany, Deutsche Welle	7130as	9505as
			9825as		
0000	0100		Guyana, Voice of	3290do	
0000	0100		Malaysia, Radio	7295as	
0000	0100	vi	Namibia, Namibian BC Corp	3270do	3290do
			6060do	6175do	
0000	0100		Netherlands, Radio	9845na	
0000	0100		New Zealand, Radio NZ Intl	15720pa	
0000	0100		Sierra Leone, Radio UNAMSIL	6137do	
0000	0100		Singapore, Mediacorp Radio	6150do	
0000	0100	DRM	UK, BBC World Service	6010am	
0000	0100		UK, BBC World Service	5975am	
0000	0100		Ukraine, Radio Ukraine Intl	7440na	
0000	0100		USA, AFRTS	4319usb	5765usb
			7590usb	7812usb	12133usb 12579usb
			12133usb	12579usb	13362usb 13855usb
0000	0100		USA, KAJI Dallas TX	5755na	
0000	0100		USA, KTBN Salt Lake City UT	7505na	
0000	0100		USA, KWHR Naalehu HI	17510as	
0000	0100		USA, WBCQ Kennebunk ME	5105na	7415na
			9330na		
0000	0100		USA, WBOH Newport NC	5920am	
0000	0100		USA, WEWN Birmingham AL	5810va	5825va
			7425va 11530va		
0000	0100		USA, WHRA Greenbush ME	7520na	
0000	0100	mtwhf	USA, WHRI Noblesville IN	7490am	9515am
0000	0100	as	USA, WHRI Noblesville IN	7315am	
0000	0100		USA, WINB Red Lion PA	9320am	
0000	0100		USA, WJIE Louisville KY	13595am	
0000	0100		USA, WRMI Miami FL 6870am	9955am	
0000	0100		USA, WRMI Miami FL 6870am	9955am	
0000	0100		USA, WTJC Newport NC	9370na	
0000	0100		USA, WWCR Nashville TN	3210na	5070na
			7465na 13845na		
0000	0100		USA, WWRB Manchester TN	3185na	5050na
			5085na 5745na	6890na	
0000	0100		USA, WYFR Okeechobee FL	6065na	9505as
			11835na	17805na	
0000	0100		Zambia, Radio Christian Voice	4965af	
0000	0157		China, China Radio Intl	6020al	6075as
			7180as 7345eu	9570al	11770as
0030	0045	s	Germany, Pan American BC	9740as	
0030	0100		Australia, Radio	12080as	13630pa
			15240pa	15415pa	17715as 17750pa
			17775as		
0030	0100	mtwhfs	Germany, Bible Voice Broadcasting	6010as	
0030	0100		Lithuania, Radio Vilnius	9875na	
0030	0100		Sri Lanka, SLBC	6005as	15745as
0030	0100		Thailand, Radio	5890na	13595na
0030	0100		UK, BBC World Service	5970as	6195as
			9410as 9740as	11955as	15280as
			15360as	17790as	15310as
0030	0100		USA, Voice of America	7215va	9780va
			11760va	15185va	15290va

0035	0100	sm	17820va	
0043	0058	twhfa	Austria, Radio Austria Intl	9870sa
0045	0100		Austria, Radio Austria Intl	9870sa
0055	0100		Pakistan, Radio	9340as 11565as
			Italy, RAI Intl	11800na

0100 UTC - 9PM EDT / 8PM CDT / 6PM PDT

0100	0115		Italy, RAI Intl	11800na	
0100	0115		Pakistan, Radio	9340as	11565as
0100	0127		Czech Rep, Radio Prague Intl	6200na	7345na
0100	0128		Hungary, Radio Budapest	9560na	
0100	0128		Vietnam, Voice of	6175na	
0100	0129	s	Germany, Universal Life	9485as	
0100	0130		Australia, Radio	9660as	12080as 13630pa
			15240pa	15415pa	17715as 17750pa
			17775as		
0100	0130	mwfa	Belarus, Radio	5970eu	7210eu
0100	0130		Slovakia, Slovak Radio	5930na	9440am
0100	0130		Uzbekistan, Radio Tashkent	7190as	9715as
0100	0157		China, China Radio Intl	6020na	9570na
			9580na		
0100	0157	DRM	Netherlands, Radio	15525na	
0100	0159		Canada, Radio Canada Intl	9755am	11990am
			13710am		
0100	0200		Anguilla, Caribbean Beacon	6090am	
0100	0200		Australia, ABC NT Katherine	5025do	
0100	0200		Australia, ABC NT Tennant Creek	4910do	
0100	0200		Australia, HCJB	15560as	
0100	0200		Australia, Voice Intl	7355as	
0100	0200		Canada, CBC Northern Service	9625do	
0100	0200		Canada, CFRX Toronto ON	6070do	
0100	0200		Canada, CFVP Calgary AB	6030do	
0100	0200		Canada, CKZN St John's NF	6160do	
0100	0200		Canada, CKZU Vancouver BC	6160do	
0100	0200		Costa Rica, University Network	5030va	6150va
			7375va 9725va		
0100	0200		Cuba, Radio Havana	6000na	9820na
0100	0200		Guyana, Voice of	3291do	
0100	0200		Indonesia, Voice of	9525as	11785pa 15150al
0100	0200		Japan, Radio	5960as	11860as 11935sa
			153235as	17560va	17685pa 17810as
			17825ca	17845as	
0100	0200		Malaysia, Radio	7295as	
0100	0200	vi	Namibia, Namibian BC Corp	3270do	3290do
			6060do	6175do	
0100	0200		Netherlands, Radio	9845na	
0100	0200		New Zealand, Radio NZ Intl	15720pa	
0100	0200		North Korea, Voice of	7140as	9345as
			9730am	11735am	13760as 15180as
0100	0200		Romania, Radio Romania Intl	6040na	9690na
			11820na	15430na	
0100	0200		Russia, Voice of	7180na	7250na 9665na
			15545na	15595na	
0100	0200		Sierra Leone, Radio UNAMSIL	6137do	
0100	0200		Singapore, Mediacorp Radio	6150do	
0100	0200		Sri Lanka, SLBC	6005as	11905as 15745as
0100	0200		UK, BBC World Service	6195as	9410as
			11955as	15280as	15310as 17790as
0100	0200		USA, AFRTS	4319usb	5446usb 5765usb
			7590usb	7812usb	12133usb 12579usb
			12133usb	12579usb	13362usb 13855usb
0100	0200		USA, KAJI Dallas TX	5755na	
0100	0200		USA, KTBN Salt Lake City UT	7505na	
0100	0200		USA, KWHR Naalehu HI	17510as	
0100	0200		USA, Voice of America	7115va	9885va
			11705va	11725va	
0100	0200		USA, WBCQ Kennebunk ME	5105na	7415na
			9330na		
0100	0200		USA, WBOH Newport NC	5920am	
0100	0200		USA, WEWN Birmingham AL	5810va	5825va
			7425va 11530va		
0100	0200		USA, WHRA Greenbush ME	5850na	
0100	0200	mtwhf	USA, WHRI Noblesville IN	7490am	9515am
0100	0200	as	USA, WHRI Noblesville IN	7315am	
0100	0200		USA, WINB Red Lion PA	9320am	
0100	0200		USA, WJIE Louisville KY	13595am	
0100	0200		USA, WRMI Miami FL 6870am	9955am	
0100	0200		USA, WTJC Newport NC	9370na	
0100	0200		USA, WWCR Nashville TN	3210na	5070na
			5935na 7465na		
0100	0200		USA, WWRB Manchester TN	3185na	5050na
			5085na 5745na	6890na	
0100	0200		USA, WYFR Okeechobee FL	6065na	9505as
0100	0200		Zambia, Radio Christian Voice	4965af	
0105	0130	sm	Austria, Radio Austria Intl	9870am	
0113	0130	twhfa	Austria, Radio Austria Intl	9870am	
0115	0130	a	Austria, Radio Austria Intl	9870sa	
0130	0200		Australia, Radio	9660as	12080as 13630pa
			15240pa	15415pa	17715as 17750pa

Shortwave Guide

MT

0130	0200	s	Belarus, Radio	5970eu	7210eu	
0130	0200		Iran, Voice of the Islamic Rep	9495am	11875am	
0130	0200		Sweden, Radio	6010na	9435va	
0130	0200	twhfa	USA, Voice of America	13740va	7405va	9775va
0133	0200	sm	Austria, Radio Austria Intl		9870me	
0143	0158	twhfa	Austria, Radio Austria Intl		9870na	
0145	0158	twhfes	Albania, Radio Tirana	6115eu	7160eu	

0200 UTC - 10PM EDT / 9PM CDT / 7PM PDT

0200	0230		Austria, AWR Europe	9895as		
0200	0230	mtwfa	Belarus, Radio	5970eu	7210eu	
0200	0230	vl	Croatia, Croatian Radio	9925sa		
0200	0230		Iran, Voice of the Islamic Rep	9495am	11875am	
0200	0230	a	UK, Wales Radio Intl	9795sa		
0200	0257		China, China Radio Intl		13640as	11770as
0200	0300		Anguilla, Caribbean Beacon		6090am	
0200	0300	twhfa	Argentina, RAE	11710am		
0200	0300		Australia, ABC NT Alice Springs		2310irr	4835do
0200	0300		Australia, ABC NT Katherine		5025do	
0200	0300		Australia, ABC NT Tennant Creek		4910do	
0200	0300		Australia, HCJB	15560as		
0200	0300		Australia, Radio	9660as	12080as	13630pa
			15240pa	15415pa	15515as	17750pa
			21725pa			
0200	0300		Australia, Voice Intl	7355as		
0200	0300		Bulgaria, Radio	9700na	11700na	
0200	0300		Canada, CBC Northern Service		9625do	
0200	0300		Canada, CFRX Toronto ON		6070do	
0200	0300		Canada, CFVP Calgary AB		6030do	
0200	0300		Canada, CKZN St John's NF		6160do	
0200	0300		Canada, CKZU Vancouver BC		6160do	
0200	0300		Costa Rica, University Network		5030va	6150va
			7375va	9725va		
0200	0300		Cuba, Radio Havana	6000na	9820na	
0200	0300		Egypt, Radio Cairo	7260na		
0200	0300		Guyana, Voice of	3291do		
0200	0300		Malaysia, Radio	7295as		
0200	0300	vl	Namibia, Namibian BC Corp	6060do	3270do	3290do
			6175do			
0200	0300		New Zealand, Radio NZ Intl		15720pa	
0200	0300		North Korea, Voice of	15100as	4405as	13650as
0200	0300		Philippines, Radio Pilipinas		11885va	15120va
			15270va			
0200	0300		Russia, Voice of	5945me	7180na	9665na
			9860na	15545na	15595na	
0200	0300		Sierra Leone, Radio UNAMSIL		6137do	
0200	0300		Singapore, Mediacorp Radio		6150do	
0200	0300		South Korea, Radio Korea Intl		9560va	11810sa
			15575va			
0200	0300		Sri Lanka, SLBC	6005as	11905as	15745as
0200	0300		Taiwan, Radio Taiwan Intl		5950na	9680na
			11875as	15465as		
0200	0300		UK, BBC World Service		5975am	9750af
			9825am	11760me	11955as	12095am
			15280as	15310as	15360as	17790as
0200	0300		USA, AFRTS	4319usb	5446usb	5765usb
			7590usb	7812usb	12133usb	12579usb
			12133usb	12579usb	13362usb	13855usb
0200	0300		USA, KAJI Dallas TX		5755na	
0200	0300		USA, KJES Vado NM		7555na	
0200	0300		USA, KTBN Salt Lake City UT		7505na	
0200	0300		USA, KWHR Naalehu HI		17510as	
0200	0300	mtwhf	USA, Voice of America		7115va	9885va
			11705va	11725va		
0200	0300		USA, WBCQ Kennebunk ME		5105na	7415na
			9330na			
0200	0300		USA, WBOH Newport NC		5920am	
0200	0300		USA, WERN Birmingham AL		5810va	5825va
			7425va	11530va		
0200	0300		USA, WHRA Greenbush ME		5850na	
0200	0300	mtwhf	USA, WHRI Noblesville IN		7490am	9515am
0200	0300	as	USA, WHRI Noblesville IN		7315am	
0200	0300		USA, WINB Red Lion PA		9320am	
0200	0300		USA, WJIE Louisville KY		13595am	
0200	0300		USA, WRMI Miami FL	6870am	9955am	
0200	0300		USA, WTJC Newport NC		9370na	
0200	0300		USA, WWCR Nashville TN		3210na	5070na
			5935na	7465na		
0200	0300		USA, WWRB Manchester TN		3185na	5050na
			5085na	5745na	6890na	
0200	0300		USA, WYFR Okeechobee FL		5985na	6065na
			9505na	11835na	11855na	
0200	0300		Zambia, Radio Christian Voice		4965af	
0215	0230		Nepal, Radio	3230as	5005as	6100as
			7165as			
0230	0258	twhfes	Albania, Radio Tirana	6115eu	7160eu	
0230	0258		Hungary, Radio Budapest		9795na	

0230	0258		Vietnam, Voice of	6175na		
0230	0300		Sweden, Radio	6010na		
0245	0300		Myanmar, Radio	9730do		
0250	0300		Vatican City, Vatican Radio		7305am	9605am

0300 UTC - 11PM EDT / 10PM CDT / 8PM PDT

0300	0327		Czech Rep, Radio Prague Intl		7345na	9870na
0300	0330		Egypt, Radio Cairo	7260na		
0300	0330		Myanmar, Radio	9730do		
0300	0330		Philippines, Radio Pilipinas		11885va	15270va
			15270va			
0300	0330		Thailand, Radio	5890na	15460na	
0300	0330		USA, KJES Vado NM	7555na		
0300	0330		USA, Voice of America		4930af	6080af
			7290af	7340af	9885af	12080af
0300	0330		Vatican City, Vatican Radio		7360af	17895af
0300	0350		Turkey, Voice of	6140va	7270va	
0300	0355		South Africa, Channel Africa		6150af	
0300	0357		China, China Radio Intl		7190na	9690na
			9790na	11770as	15110as	
0300	0400		Anguilla, Caribbean Beacon		6090am	
0300	0400		Australia, ABC NT Alice Springs		2310irr	4835do
0300	0400		Australia, ABC NT Katherine		5025do	
0300	0400		Australia, ABC NT Tennant Creek		4910do	
0300	0400		Australia, Radio	9660as	12080as	13630pa
			15240pa	15415pa	15515as	17750pa
			21725pa			
0300	0400		Canada, CBC Northern Service		9625do	
0300	0400		Canada, CFRX Toronto ON		6070do	
0300	0400		Canada, CFVP Calgary AB		6030do	
0300	0400		Canada, CKZN St John's NF		6160do	
0300	0400		Canada, CKZU Vancouver BC		6160do	
0300	0400		Costa Rica, University Network		5030va	6150va
			7375va	9725va		
0300	0400		Cuba, Radio Havana	6000na	9820na	
0300	0400	vl	Guatemala, Radio Cultural		3300sa	
0300	0400		Guyana, Voice of	3291do		
0300	0400		Japan, Radio	21610pa		
0300	0400		Malaysia, Radio	7295as		
0300	0400		Malaysia, Voice of	6175as	9750as	15295as
0300	0400	vl	Namibia, Namibian BC Corp	6060do	3270do	3290do
			6175do			
0300	0400		New Zealand, Radio NZ Intl		15720pa	
0300	0400		North Korea, Voice of	15100as	3560as	7140as
			9345as	9730as		
0300	0400		Oman, Radio	15335as		
0300	0400		Russia, Voice of	5900na	7180na	9665na
			9860na	15545na	15595na	
0300	0400	vl	Rwanda, Radio	6055do	17660na	
0300	0400		Sierra Leone, Radio UNAMSIL		6137do	
0300	0400		Singapore, Mediacorp Radio		6150do	
0300	0400		South Africa, Channel Africa		3345af	
0300	0400		Sri Lanka, SLBC	6005as	11905as	15745as
0300	0400		Taiwan, Radio Taiwan Intl		5950na	15215va
			15320va			
0300	0400	vl	Uganda, Radio	4976do	5026do	7196do
0300	0400		UK, BBC World Service		3255af	5975am
			6005af	6190af	6195eu	7160af
			9750af	11760me	17760as	11765af
			12095as	15280as	15310as	15420af
			15575me	17760as	17790as	21660as
0300	0400	vl/ mtwhf	UK, Sudan Radio Service		9625va	
0300	0400		Ukraine, Radio Ukraine Intl		7440na	
0300	0400		USA, AFRTS	4319usb	5446usb	5765usb
			7590usb	7812usb	12133usb	12579usb
			12133usb	12579usb	13362usb	13855usb
0300	0400		USA, KAJI Dallas TX		5755na	
0300	0400		USA, KTBN Salt Lake City UT		7505na	
0300	0400		USA, KWHR Naalehu HI		17510as	
0300	0400		USA, WBCQ Kennebunk ME		5105na	7415na
			9330na			
0300	0400		USA, WBOH Newport NC		5920am	
0300	0400		USA, WERN Birmingham AL		5810va	5825va
			7425va	11530va		
0300	0400		USA, WHRA Greenbush ME		5850na	
0300	0400	mtwhf	USA, WHRI Noblesville IN		7490am	9515am
0300	0400	as	USA, WHRI Noblesville IN		7315am	
0300	0400		USA, WINB Red Lion PA		9320am	
0300	0400		USA, WJIE Louisville KY		13595am	
0300	0400		USA, WRMI Miami FL	6870am	9955am	
0300	0400		USA, WTJC Newport NC		9370na	
0300	0400		USA, WWCR Nashville TN		3210na	5070na
			5935na	5935na		
0300	0400		USA, WWRB Manchester TN		3185na	5050na
			5085na	5745na	6890na	
0300	0400		USA, WYFR Okeechobee FL		6065na	9505na
			11740na	15255na		
0300	0400		Zambia, Radio Christian Voice		4965af	
0300	0400	vl	Zimbabwe, ZBC Corp	5975do		

Shortwave Guide



0330	0345	Hungary, Radio Budapest	6025eu	9655eu
0330	0345	Israel, Kol Israel 7545va	9345va	11605va
		17600va		
0330	0357	Czech Rep, Radio Prague Intl	9445va	11600va
0330	0358	Vietnam, Voice of 6175am		
0330	0400	UAE, Emirates Radio 12005na	13675na	15400na
0330	0400	mtwhf USA, Voice of America	7290af	12080af
		17895af		
0330	0400	USA, Voice of America	4930af	6080af
		9885af		

0430	0500	Nigeria, Radio/Ibadan	6050do	
0430	0500	Nigeria, Radio/Kaduna	4770do	
0430	0500	Nigeria, Radio/Lagos 3326do	4990do	
0430	0500	Serbia & Montenegro, Intl Radio	9580va	
0430	0500	Swaziland, TWR 3200af	4775af	
0430	0500	USA, Voice of America	4930af	4960af
		7290af 9575af	11835af	12080af
0445	0500	Italy, RAI Intl	6110af	7235af
0459	0500	New Zealand, Radio NZ Intl	11820pa	9800af

0400 UTC - 12AM EDT / 11PM CDT / 9PM PDT

0400	0430	Australia, Radio	9660as	12080as	13630pa
		15240pa	15515pa	17750pa	21725pa
0400	0430	France, Radio France Intl	7315af	11700af	
0400	0430	Sri Lanka, SLBC	6005as	11905as	15745as
0400	0430	USA, Voice of America	4930af	4960af	
		6080af 7290af	9575af	9885af	11835af
		12080af	17895af		
0400	0457	China, China Radio Intl	6190na	9560na	
		9755na			
0400	0457	DRM Netherlands, Radio	15400au		
0400	0458	New Zealand, Radio NZ Intl	15720pa		
0400	0500	Anguilla, Caribbean Beacon	6090am		
0400	0500	Australia, ABC NT Alice Springs	2310irr	4835do	
0400	0500	Australia, ABC NT Katherine	5025do		
0400	0500	Australia, ABC NT Tennant Creek	4910do		
0400	0500	Canada, CBC Northern Service	9625do		
0400	0500	Canada, CFRX Toronto ON	6070do		
0400	0500	Canada, CKZN St John's NF	6160do		
0400	0500	Canada, CKZU Vancouver BC	6160do		
0400	0500	Costa Rica, University Network	5030va	6150va	
		7375va 9725va			
0400	0500	Cuba, Radio Havana	6000na	9820na	
0400	0500	Germany, Deutsche Welle	15445as	7170af	11945as
0400	0500	Guyana, Voice of	3291do		
0400	0500	Malaysia, Radio	7295as		
0400	0500	Malaysia, Voice of	6175as	9750as	15295as
0400	0500	vi Namibia, Namibian BC Corp	6060do	3270do	3290do
		6175do			
0400	0500	Netherlands, Radio	6165na	9590na	
0400	0500	Nigeria, Radio/Kaduna	6090do		
0400	0500	Romania, Radio Romania Intl	9780va	11820va	
		15140va			
		17860va			
0400	0500	Russia, Voice of	5900na	7180na	15545na
		15595na			
0400	0500	Rwanda, Radio	6055do		
0400	0500	Sierra Leone, Radio UNAMSIL	6137do		
0400	0500	Singapore, Mediacorp Radio	6150do		
0400	0500	South Africa, Channel Africa	3345af		
0400	0500	Uganda, Radio	4976do	5026do	7196do
0400	0500	vi UK, BBC World Service	6010na		
0400	0500	DRM UK, BBC World Service	3255af	6005af	
		6195eu 7160af	9410va	11760eu	
		11760me		12035af	15310as
		15280as		15420af	15575me
		17760as		21660as	
		17790as			
0400	0500	vi/ mtwhf UK, Sudan Radio Service	9625va		
0400	0500	USA, AFRTS	4319usb	5446usb	5765usb
		7590usb	7812usb	12133usb	12579usb
		12133usb	12579usb	13362usb	13855usb
0400	0500	USA, KAJI Dallas TX	5755na		
0400	0500	USA, KTVN Salt Lake City UT	7505na		
0400	0500	USA, KWHR Naalehu HI	17510as		
0400	0500	USA, WBCQ Kennebunk ME	5105na	7415na	
		9330na			
0400	0500	USA, WBOH Newport NC	5920am		
0400	0500	USA, WEWN Birmingham AL	5810va	5825va	
		7425va 11530va			
0400	0500	USA, WHRA Greenbush ME	5850na		
0400	0500	USA, WHRI Noblesville IN	5835am	7465am	
0400	0500	USA, WHRI Noblesville IN	5835am		
0400	0500	USA, WINB Red Lion PA	9320am		
0400	0500	USA, WJIE Louisville KY	13595am		
0400	0500	USA, WMLK Bethel PA	9265eu	9955eu	
0400	0500	USA, WRMI Miami FL 6870am	9955am		
0400	0500	USA, WTJC Newport NC	9370na		
0400	0500	USA, WWCR Nashville TN	3210na	5070na	
		5935na 5935na			
0400	0500	USA, WWRB Manchester TN	3185na	5050na	
		5085na 5745na	6890na		
0400	0500	USA, WYFR Okeechobee FL	6065na	6855eu	
		7355eu 9505eu	9715eu		
0400	0500	Zambia, Radio Christian Voice	4965af		
0400	0500	vi Zimbabwe, ZBC Corp 5975do			
0430	0500	Australia, Radio	9660as	12080as	13630pa
		15240pa	15415pa	15515va	17750pa
		21725pa			

0500 UTC - 1AM EDT / 12AM CDT / 10PM PDT

0500	0520	Vatican City, Vatican Radio	4005eu	5890eu	
		7250eu			
0500	0530	Australia, Radio	9660as	12080as	13630pa
		15160pa	15240pa	15515va	17750pa
0500	0530	France, Radio France Intl	9825af	15160af	
0500	0530	vi Rwanda, Radio	6055do		
0500	0530	UK, BBC World Service	6005af	6190af	
		7160af 11765af	11940af	11955me	11765af
		12035af	12095va	15280as	15310as
		15420af	15575me	17760as	17790as
		21660as			
0500	0530	UK, BBC World Service	6005af	6195af	
		7160af 9410va	11765af	11940af	11955as
		15280as	15310as	15360as	17640af
		17760as	17790as	17885af	21660as
0500	0530	Vatican City, Vatican Radio	7360af	9660af	
		11625af			
0500	0555	South Africa, Channel Africa	9685af		
0500	0557	China, China Radio Intl	6190as	9515af	
		11770as	11880as	15350as	15465as
		17540as			
0500	0600	Anguilla, Caribbean Beacon	6090am		
0500	0600	Australia, ABC NT Alice Springs	2310irr	4835do	
0500	0600	Australia, ABC NT Katherine	5025do		
0500	0600	Australia, ABC NT Tennant Creek	4910do		
0500	0600	Canada, CBC Northern Service	9625do		
0500	0600	Canada, CFRX Toronto ON	6070do		
0500	0600	Canada, CKZN St John's NF	6160do		
0500	0600	Canada, CKZU Vancouver BC	6160do		
0500	0600	Costa Rica, University Network	5030va	6150va	
		7375va 9725va			
0500	0600	Cuba, Radio Havana	6000va	6060va	9550va
		11760va			
0500	0600	Germany, Deutsche Welle	9630af	9700af	
		15410af	17800af		
0500	0600	Guyana, Voice of	3291do		
0500	0600	Japan, Radio	5975eu	6110na	7230eu
		15195as	17810as	21755pa	
0500	0600	Malaysia, Radio	7295as		
0500	0600	Malaysia, Voice of	6175as	9750as	15295as
0500	0600	vi Namibia, Namibian BC Corp	6060do	3270do	3290do
		6175do			
0500	0600	New Zealand, Radio NZ Intl	11820pa		
0500	0600	Nigeria, Radio/Ibadan	6050do		
0500	0600	Nigeria, Radio/Kaduna	4770do	6090do	
0500	0600	Nigeria, Radio/Lagos 3326do	4990do		
0500	0600	Nigeria, Voice of	15120af		
0500	0600	Russia, Voice of	17665pa	21790pa	
0500	0600	Sierra Leone, Radio UNAMSIL	6137do		
0500	0600	Singapore, Mediacorp Radio	6150do		
0500	0600	South Africa, Channel Africa	7240af		
0500	0600	Swaziland, TWR	3200af	4775af	9500af
0500	0600	vi Uganda, Radio	4976do	5026do	7196do
0500	0600	UK, BBC World Service	6195eu	6195eu	11760me
		12095eu	15565eu	15575me	
0500	0600	vi/ mtwhf UK, Sudan Radio Service	11795va		
0500	0600	USA, AFRTS	4319usb	5446usb	5765usb
		7590usb	7812usb	12133usb	12579usb
		12133usb	12579usb	13362usb	13855usb
0500	0600	USA, KAJI Dallas TX	5755na		
0500	0600	USA, KTVN Salt Lake City UT	7505na		
0500	0600	USA, KWHR Naalehu HI	9510as	17510as	
0500	0600	USA, Voice of America	4930af	6080af	
		6180af 7290af	12080af	13645af	
0500	0600	USA, WBCQ Kennebunk ME	5105na	7415na	
		9330na			
0500	0600	USA, WBOH Newport NC	5920am		
0500	0600	USA, WEWN Birmingham AL	5745va	7425va	
		7570va 11615va			
0500	0600	USA, WHRA Greenbush ME	7490na		
0500	0600	USA, WHRI Noblesville IN	7315am	7465am	
0500	0600	USA, WJIE Louisville KY	13595am		
0500	0600	USA, WMLK Bethel PA	9265eu	9955eu	
0500	0600	USA, WRMI Miami FL 6870am	9955am		
0500	0600	USA, WTJC Newport NC	9370na		
0500	0600	USA, WWCR Nashville TN	3210na	5070na	
		5935na 5935na			
0500	0600	USA, WWRB Manchester TN	3185na	5050na	

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0500	0600		5085na6890na		
0500	0600		USA, WYFR Okeechobee FL	6855eu	9355eu
0500	0600	vl	Zambia, Radio Christian Voice	4965af	
0505	0520	m	Zimbabwe, ZBC Corp5975do		
0505	0530	as	Austria, Radio Austria Intl	17870me	
0515	0600		Austria, Radio Austria Intl	17870me	
0525	0600	vl	Zambia, Radio Christian Voice	9555af	
0530	0600		Ghana, Ghana BC Corp	3366do	4915do
			Australia, Radio	9660as	12080as
				15160pa	15240va
				17750as	
0530	0600		Thailand, Radio	13780eu	17690va
0530	0600		UK, BBC World Service	6005af	6190af
				7160af 9410af	11765af
				15310as	15360as
				17760as	17790as
0530	0600	mtwhf	UK, BBC World Service	17885af	
0545	0600	twh	Austria, Radio Austria Intl	17870me	
0545	0600	vl	Rwanda, Radio	6055do	

0600 UTC - 2AM EDT / 1AM CDT / 11PM PDT

0600	0605	vl	Croatia, Croatian Radio	13820na	
0600	0615	as	South Africa, TWR	11640af	
0600	0630		France, Radio France Intl	17800af	11665af 15160af
0600	0645	mtwhf	South Africa, TWR	11640af	
0600	0655		South Africa, Channel Africa	15440af	
0600	0657		China, China Radio Intl	6115na	11770as
				11775al	15140as
				15465as	17540as
0600	0700		Anguilla, Caribbean Beacon	6090am	
0600	0700		Australia, ABC NT Alice Springs	2310irr	4835do
0600	0700		Australia, ABC NT Katherine	5025do	
0600	0700		Australia, ABC NT Tennant Creek	4910do	
0600	0700		Australia, Radio	9660as	13630as
				15160pa	15240va
				17750va	15415as
0600	0700		Australia, Voice Intl	15335as	
0600	0700		Canada, CFRX Toronto ON	6070do	
0600	0700		Canada, CFVP Calgary AB	6030do	
0600	0700		Canada, CKZN St John's NF	6160do	
0600	0700		Canada, CKZU Vancouver BC	6160do	
0600	0700		Costa Rica, University Network	5030va	6150va
				7375va 9725va	11870va
0600	0700		Cuba, Radio Havana	6000va	6060va
				11760va	9550va
0600	0700		Germany, Deutsche Welle	6140eu	7170af
				15275af	17860af
0600	0700	DRM	Germany, Deutsche Welle	21675eu	
0600	0700	vl	Ghana, Ghana BC Corp	3366do	4915do
0600	0700		Guyana, Voice of	3291do	
0600	0700		Japan, Radio	7230eu	11715as
0600	0700			11760as	11740as
				21755pa	15195as
0600	0700		Liberia, ELWA	4760do	
0600	0700		Malaysia, Radio	7295as	
0600	0700		Malaysia, Voice of	6175as	9750as
0600	0700	vl	Namibia, Namibian BC Corp	6060do	15295as
				6175do	3290do
0600	0700		New Zealand, Radio NZ Intl	11820pa	
0600	0700		Nigeria, Radio/Ibadan	6050do	
0600	0700		Nigeria, Radio/Kaduna	4770do	6090do
0600	0700		Nigeria, Radio/Lagos	3326do	
0600	0700		Nigeria, Voice of	15120af	
0600	0700		Russia, Voice of	17665pa	21790pa
0600	0700	DRM	Russia, Voice of	15780eu	
0600	0700		Sierra Leone, Radio UNAMSIL	6137do	
0600	0700	irreg/ vl	Sierra Leone, SLBS	3316do	
0600	0700		Singapore, MediCorp Radio	6150do	
0600	0700	vl	Solomon Islands, SIBC	5020do	9545do
0600	0700		South Africa, Channel Africa	7240af	
0600	0700		Swaziland, TWR	4775af	9500af
0600	0700		Swaziland, TWR	4775af	6120af
0600	0700		Taiwan, Radio Taiwan Intl	5950na	
0600	0700		UK, BBC World Service	6005af	6190af
				9410va 11765as	11955as
				15310as	15360as
				15575me	17790as
0600	0700	as	UK, BBC World Service	17885af	
0600	0700		USA, AFRTS	4319usb	5765usb
				7590usb	7812usb
				12133usb	12579usb
				12133usb	13362usb
0600	0700		USA, KALJ Dallas TX	5755na	13855usb
0600	0700		USA, KTNB Salt Lake City UT	7505na	
0600	0700		USA, KWHR Naalehu HI	9510as	13700as
0600	0700		USA, Voice of America	6080af	6180af
				7290af 12080af	13645af
0600	0700		USA, WBCQ Kennebunk ME	5105na	7415na
0600	0700		USA, WBOH Newport NC	5920am	
0600	0700		USA, WEWN Birmingham AL	5745va	7425va
				7570va 11615va	

0600	0700		USA, WHRA Greenbush ME	7490na	
0600	0700		USA, WHRI Noblesville IN	7315am	7465am
0600	0700		USA, WJIE Louisville KY	13595am	
0600	0700		USA, WMLK Bethel PA	9265eu	9955eu
0600	0700		USA, WRMI Miami FL 6870am	9955am	
0600	0700		USA, WTJC Newport NC	9370na	
0600	0700		USA, WWCR Nashville TN	3210na	5070na
				5935na 5935na	
0600	0700		USA, WYFR Okeechobee FL	5810eu	7355eu
				9680eu 11530eu	11580eu
0600	0700	vl	Vanuatu, Radio	4960do	
0600	0700		Yemen, Rep of Yemen Radio	9780me	
0600	0700		Zambia, Radio Christian Voice	9865af	
0600	0700	vl	Zimbabwe, ZBC Corp5975do		
0630	0700		Bulgaria, Radio	11600eu	13600eu
0630	0700	s	Germany, Bible Voice Broadcasting	5945eu	
0630	0700		Romania, Radio Romania Intl	9655eu	11830eu
0630	0700		Vatican City, Vatican Radio	9660af	11625af
				13765af	
0645	0700	s	Albania, TWR	11865eu	
0645	0700	s	Monaco, TWR	9870eu	

0700 UTC - 3AM EDT / 2AM CDT / 12AM PDT

0700	0705		New Zealand, Radio NZ Intl	11820pa	
0700	0727		Czech Rep, Radio Prague Intl	9880eu	11600eu
0700	0730		Slovakia, Slovak Radio	9440va	15460pa
0700	0730		UK, BBC World Service	11760me	15575me
0700	0800	mtwhf	Albania, TWR	11865eu	
0700	0800		Anguilla, Caribbean Beacon	6090am	
0700	0800		Australia, ABC NT Alice Springs	2310irr	4835do
0700	0800		Australia, ABC NT Katherine	5025do	
0700	0800		Australia, ABC NT Tennant Creek	4910do	
0700	0800		Australia, HCJB	11750au	
0700	0800		Australia, Radio	9660as	12080as
				15160pa	15240va
0700	0800		Australia, Voice Intl	15335as	15415as
0700	0800		Canada, CFRX Toronto ON	6070do	
0700	0800		Canada, CFVP Calgary AB	6030do	
0700	0800		Canada, CKZN St John's NF	6160do	
0700	0800		Canada, CKZU Vancouver BC	6160do	
0700	0800		China, China Radio Intl	11880as	13710al
				15350as	17540as
0700	0800		Costa Rica, University Network	5030va	6150va
				7375va 9725va	11870va
0700	0800		Eat Guinea, Radio Africa	15190af	
0700	0800		France, Radio France Intl	15605af	
0700	0800	as	Germany, Bible Voice Broadcasting	5945eu	
0700	0800		Germany, Deutsche Welle	6140eu	
0700	0800	DRM	Germany, Deutsche Welle	21675eu	
0700	0800	vl	Ghana, Ghana BC Corp	3366do	4915do
0700	0800		Guyana, Voice of	3291do	5950do
0700	0800	vl/as	Italy, IRRS 13840va		
0700	0800		Liberia, ELWA	4760do	
0700	0800		Malaysia, Radio	7295as	
0700	0800		Malaysia, Voice of	6175as	9750as
0700	0800	mtwhfa	Monaco, TWR	9870eu	15295as
0700	0800		Myanmar, Radio	9730do	
0700	0800	vl	Namibia, Namibian BC Corp	6060do	3270do
				6175do	3290do
0700	0800		Nigeria, Radio/Ibadan	6050do	
0700	0800		Nigeria, Radio/Kaduna	4770do	6090do
0700	0800		Nigeria, Radio/Lagos	3326do	
0700	0800		Russia, Voice of	17495pa	17635pa
0700	0800	DRM	Russia, Voice of	15780eu	21790pa
0700	0800		Sierra Leone, Radio UNAMSIL	6137do	
0700	0800	irreg/ vl	Sierra Leone, SLBS	3316do	
0700	0800		Singapore, MediCorp Radio	6150do	
0700	0800	vl	Solomon Islands, SIBC	5020do	9545do
0700	0800		South Africa, Channel Africa	7240af	
0700	0800		Swaziland, TWR	4775af	6120af
0700	0800		Swaziland, TWR	4775af	9500af
0700	0800		Taiwan, Radio Taiwan Intl	5950na	
0700	0800		UK, BBC World Service	6005af	6190af
				11940af	11955as
				15310as	15360as
				17760as	17790as
0700	0800		USA, AFRTS	4319usb	5446usb
				7590usb	7812usb
				12133usb	12579usb
				12133usb	13855usb
0700	0800		USA, KALJ Dallas TX	5755na	
0700	0800		USA, KTNB Salt Lake City UT	7505na	
0700	0800		USA, KWHR Naalehu HI	9510as	13700as
0700	0800		USA, Voice of America	6080af	7290af
				13645af	
0700	0800		USA, WBCQ Kennebunk ME	5105na	7415na
0700	0800		USA, WBOH Newport NC	5920am	
0700	0800		USA, WEWN Birmingham AL	5745va	7475va
				7570va 11615va	
0700	0800		USA, WHRI Noblesville IN	7315am	7465am

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0700	0800		USA, WJIE Louisville KY	13595am	
0700	0800		USA, WMLK Bethel PA	9265eu	9955eu
0700	0800		USA, WRMI Miami FL 6870am	9955am	
0700	0800		USA, WTJC Newport NC	9370na	
0700	0800		USA, WWCR Nashville TN	3210na	5070na
			5935na5935na		
0700	0800		USA, WYFR Okeechobee FL	5985va	6855va
			7355va9505va	9715va	9930va
0700	0800	vl	Vanuatu, Radio	4960do	
0706	0800		New Zealand, Radio NZ Intl		9885pa
0715	0750	a	Albania, TWR	11865eu	
0715	0750	a	Monaco, TWR	9870eu	
0730	0800		Georgia, Radio Georgia		11805eu
0730	0800	as	Guam, TWR/KTWR	15255as	
0730	0800	as	UK, BBC World Service	15575me	17885af
0740	0800	mtwhf	Guam, TWR/KTWR	15225as	

0800 UTC - 4AM EDT / 3AM CDT / 1AM PDT

0800	0820	mtwhfs	Albania, TWR	11865eu	
0800	0820	s	Monaco, TWR	9870eu	
0800	0830		Australia, ABC NT Katherine	5025do	
0800	0830		Australia, ABC NT Tennant Creek	4910do	
0800	0830		Australia, Radio	5995as	9580as 9590as
			9710as 12080pa	13630pa	15240pa 17750pa
0800	0830	as	Australia, Radio	15415va	
0800	0830		Liberia, ELWA	4760do	
0800	0830		Malaysia, Voice of	6175as	9750as
0800	0830		Myanmar, Radio	9730do	
0800	0830		Swaziland, TWR	4775af	9500af
0800	0845	as	Germany, Bible Voice Broadcasting	5945eu	
0800	0857		China, China Radio Intl	13710al	15350as
			15465as	17490eu	
0800	0900		Anguilla, Caribbean Beacon	6090am	
0800	0900		Australia, ABC NT Alice Springs	2310irr	4835do
0800	0900		Australia, HCJB	11750au	
0800	0900		Australia, Voice Intl	15335as	
0800	0900		Canada, CFRX Toronto ON		6070do
0800	0900		Canada, CFVP Calgary AB		6030do
0800	0900		Canada, CKZN St John's NF		6160do
0800	0900		Canada, CKZU Vancouver BC		6160do
0800	0900		Costa Rica, University Network	5030va	6150va
			7375va9725va	11870va	
0800	0900		Eat Guinea, Radio Africa		15190af
0800	0900		Germany, Deutsche Welle		6140eu
0800	0900	DRM	Germany, Deutsche Welle		21675eu
0800	0900	vl	Ghana, Ghana BC Corp	3366do	4915do
0800	0900	mtwhf	Guam, TWR/KTWR	11840as	15225as
0800	0900		Guyana, Voice of	3291do	5950do
0800	0900		Indonesia, Voice of	9525as	11785pa
0800	0900	vl/as	Italy, IRRS 13840va	15725al	15150al
0800	0900		Malaysia, Radio	7295as	
0800	0900		Malaysia, Voice of	15295as	
0800	0900		New Zealand, Radio NZ Intl		9885pa
0800	0900		Nigeria, Radio/Ibadan		6050do
0800	0900		Nigeria, Radio/Kaduna		4770do 6090do
0800	0900		Nigeria, Radio/Lagos	3326do	4990do
0800	0900	vl	Pakistan, Radio	15100eu	17835eu
0800	0900		Papua New Guinea, Catholic Radio		4960do
0800	0900		Papua New Guinea, NBC	4890do	
0800	0900		Russia, Voice of	17495pa	17635pa
0800	0900	DRM	Russia, Voice of	15780eu	21790pa
0800	0900		Sierra Leone, Radio UNAMSIL		6137do
0800	0900	irreg/ vl	Sierra Leone, SLBS	3316do	
0800	0900		Singapore, Mediacorp Radio		6150do
0800	0900	vl	Solomon Islands, SIBC		5020do 9545do
0800	0900	s	South Africa, African Radio League	7205af	17810af
0800	0900		South Korea, Radio Korea Intl	9570as	9640eu
0800	0900		Taiwan, Radio Taiwan Intl	9610pa	
0800	0900		UK, BBC World Service	6190af	11760me
			11940af	11955as	15310as 15360as
			15400af	15485af	15575me 17640eu
			17760as	17790as	17830af 17885af
			21470af	21660as	
0800	0900		USA, AFRTS	4319usb	5446usb 5765usb
			7590usb	7812usb	12133usb 12579usb
			12133usb	12579usb	13362usb 13855usb
0800	0900		USA, KAIJ Dallas TX	5755na	
0800	0900		USA, KNLS Anchor Point AK		11870as
0800	0900		USA, KTVN Salt Lake City UT		7505na
0800	0900		USA, KWHR Naalehu HI		9510as 13700as
0800	0900		USA, Voice of America		6080af 7290af
			13645af		
0800	0900		USA, WBCQ Kennebunk ME		5105na 7415na
0800	0900		USA, WBOH Newport NC		5920am
0800	0900		USA, WERN Birmingham AL		5745na 7425na
			11875na		
0800	0900		USA, WHRI Noblesville IN		7315am 7520am
0800	0900		USA, WJIE Louisville KY		13595am
0800	0900		USA, WMLK Bethel PA		9265eu 9955eu

0800	0900		USA, WRMI Miami FL 6870am	9955am	
0800	0900		USA, WTJC Newport NC	9370na	
0800	0900		USA, WWCR Nashville TN	3210na	5070na
			5935na5935na		
0800	0900		USA, WYFR Okeechobee FL	5950af	5985af
			6855af 9930af		
0800	0900	vl	Vanuatu, Radio	4960do	
0815	0900	as	Guam, TWR/KTWR	11840as	
0830	0900		Australia, ABC NT Katherine		2485do
0830	0900		Australia, ABC NT Tennant Creek		2325do
0830	0900		Australia, Radio	5995as	9580as 9590as
			9710as 12080pa	13630pa	15240pa 15415pa
			17750pa		

0900 UTC - 5AM EDT / 4AM CDT / 2AM PDT

0900	0915	vl	Ghana, Ghana BC Corp	3366do	4915do
0900	0927		Czech Rep, Radio Prague Intl	21745va	
0900	0930		Australia, Radio	9580as	9590as 15240as
0900	0930	as	Australia, Radio	15415va	
0900	0930		Guam, TWR/KTWR	11840as	
0900	1000		Anguilla, Caribbean Beacon		6090am
0900	1000		Australia, ABC NT Alice Springs		2310do 4835irr
0900	1000		Australia, ABC NT Katherine		2485do
0900	1000		Australia, ABC NT Tennant Creek		2325do
0900	1000		Australia, HCJB		11750au
0900	1000		Australia, Voice Intl		11955as
0900	1000		Canada, CFRX Toronto ON		6070do
0900	1000		Canada, CFVP Calgary AB		6030do
0900	1000		Canada, CKZN St John's NF		6160do
0900	1000		Canada, CKZU Vancouver BC		6160do
0900	1000		China, China Radio Intl		15210pa 17490eu
			17690pa		
0900	1000		Costa Rica, University Network	5030va	6150va
			7375va9725va	11870va	
0900	1000		Eat Guinea, Radio Africa		13750va
0900	1000		Germany, Deutsche Welle		15190af
0900	1000	DRM	Germany, Deutsche Welle		6140eu
0900	1000		Guyana, Voice of		21675eu 5950do
0900	1000	vl/as	Italy, IRRS 13840va	15725al	
0900	1000		Malaysia, Radio	7295as	
0900	1000		Malaysia, Voice of	15295as	
0900	1000	vl	Namibia, Namibian BC Corp		3270do 3290do
			6060do	6175do	
0900	1000		New Zealand, Radio NZ Intl		9885pa
0900	1000		Nigeria, Radio/Ibadan		6050do
0900	1000		Nigeria, Radio/Kaduna		4770do 6090do
0900	1000		Nigeria, Radio/Lagos	3326do	4990do
0900	1000	vl	Pakistan, Radio	15100eu	17835eu
0900	1000		Papua New Guinea, Catholic Radio		4960do
0900	1000		Papua New Guinea, NBC		4890do
0900	1000	vl	Rwanda, Radio		6055do
0900	1000		Sierra Leone, Radio UNAMSIL		6137do
0900	1000	irreg/ vl	Sierra Leone, SLBS	3316do	
0900	1000		Singapore, Mediacorp Radio		6150do
0900	1000	vl	Solomon Islands, SIBC		5020do 9545do
0900	1000		UK, BBC World Service		6190af 6195va
			9605as 9740as	11760me	11940af 15310as
			15360as	15400af	15485af 15575me
			17640eu	17760as	17790as 17830af
			17885af	21470af	21660as
0900	1000		USA, AFRTS	4319usb	5446usb 5765usb
			7590usb	7812usb	12133usb 12579usb
			12133usb	12579usb	13362usb 13855usb
0900	1000		USA, KAIJ Dallas TX	5755na	
0900	1000		USA, KTVN Salt Lake City UT		7505na
0900	1000		USA, KWHR Naalehu HI		9510as 9930as
0900	1000		USA, Voice of America		9705va 15205va
			17745va		
0900	1000		USA, WBCQ Kennebunk ME		5105na 7415na
0900	1000		USA, WBOH Newport NC		5920am
0900	1000		USA, WERN Birmingham AL		5745na 7425na
			11875na		
0900	1000		USA, WHRI Noblesville IN		7520am 9495am
0900	1000		USA, WJIE Louisville KY		13595am
0900	1000		USA, WRMI Miami FL 6870am		9955am
0900	1000		USA, WTJC Newport NC		9370na
0900	1000		USA, WWCR Nashville TN		5070na 5765na
			5935na9985na		
0900	1000		USA, WYFR Okeechobee FL	5985af	6855af
			9755af		
0900	1000	vl	Vanuatu, Radio	4960do	
0905	1000	vl/s	Greece, Voice of	9420eu	11645eu 15630eu
			15650eu	21530eu	
0930	0945		Israel, Kol Israel		17535va
0930	1000		Australia, Radio	9580as	9590as 15240as
			15415pa		
0930	1000	s	UAE, Radio UNMEE	21460af	

Shortwave Guide



1000 UTC - 6AM EDT / 5AM CDT / 3AM PDT

1000	1030	Australia, Voice Intl	1195as	13685as	
1000	1030	Guam, AVR/KSDA	11930as		
1000	1030	Mongolia, Voice of	12085as		
1000	1057	China, China Radio Intl		15210pa	17490pa
		17690pa			
1000	1059	New Zealand, Radio NZ Intl	9885pa		
1000	1100	Anguilla, Caribbean Beacon	11775am		
1000	1100	Australia, ABC NT Alice Springs	2310do	4835irr	
1000	1100	Australia, ABC NT Katherine	2485do		
1000	1100	Australia, ABC NT Tennant Creek	2325do		
1000	1100	Australia, HCJB	15425as		
1000	1100	Australia, Radio	9580as	9590as	15240as
		15415pa			
1000	1100	Canada, CFRX Toronto ON	6070do		
1000	1100	Canada, CFVP Calgary AB	6030do		
1000	1100	Canada, CKZN St John's NF	6160do		
1000	1100	Canada, CKZU Vancouver BC	6160do		
1000	1100	Costa Rica, University Network	5030va	6150va	
		7375va 9725va	11870va	13750va	
1000	1100	Guyana, Voice of	3291do	5950do	
1000	1100	India, All India Radio	13695as	15020as	15410as
		17800as	17895as		
1000	1100	Italy, IRRS 13840va	15725al		
1000	1100	Japan, Radio	6120na	9695as	11730as
		17585eu	17720va	21755pa	
1000	1100	Malaysia, Radio	7295as		
1000	1100	Malaysia, Voice of	15295as		
1000	1100	Netherlands, Radio	9790va	12065va	13710va
		13820va			
1000	1100	Nigeria, Voice of	15120af		
1000	1100	North Korea, Voice of		3560as	6185as
		6285as 9335ca	9850ca		
1000	1100	Papua New Guinea, Catholic Radio			4960do
1000	1100	Papua New Guinea, NBC	4890do		
1000	1100	Singapore, Mediacorp Radio	6150do		
1000	1100	Solomon Islands, SIBC	5020do	9545do	
1000	1100	South Africa, Channel Africa	11825af		
1000	1100	UK, BBC World Service	6190af	6195va	
		9605as 11760me	11940af	15310as	15360as
		15485af	15575me	17640eu	17640me
		17760as	17790as	17885af	21470af
		21660as			
1000	1100	as	UK, BBC World Service	15400af	17830af
1000	1100		USA, AFRTS	4319usb	5446usb
			7590usb	7812usb	12133usb
			12133usb	12579usb	13855usb
1000	1100		USA, KALJ Dallas TX	5755na	
1000	1100		USA, KNLS Anchor Point AK		9795as
1000	1100		USA, KTNB Salt Lake City UT	7505na	
1000	1100		USA, KWHR Naalehu HI	9930as	
1000	1100		USA, Voice of America	9705va	15205va
			17745va		
1000	1100		USA, WBCQ Kennebunk ME	5105na	
1000	1100		USA, WBOH Newport NC	5920am	
1000	1100		USA, WEWN Birmingham AL	5850na	7425na
			11875na		
1000	1100		USA, WHRI Noblesville IN	7520am	9495am
1000	1100		USA, WRMI Miami FL 6870am	9955am	
1000	1100		USA, WTJC Newport NC	9370na	
1000	1100		USA, WWCR Nashville TN	5070na	5765na
			5935na 15825na		
1000	1100		USA, WYFR Okeechobee FL	5950na	5985na
			6855na 9755na		
1030	1045	mtwhf	Ethiopia, Radio	5990af	7110af
1030	1057		Czech Rep, Radio Prague Intl	9880eu	11615eu
1030	1058		Vietnam, Voice of	7285as	
1030	1100		Iran, Voice of the Islamic Rep		15660as
1030	1100		Vatican City, Vatican Radio	5885eu	17660as

1100 UTC - 7AM EDT / 6AM CDT / 4AM PDT

1100	1104	vl	Pakistan, Radio	15100eu	17835eu	
1100	1128		Vietnam, Voice of	9840as	7220as	7285as
1100	1130		Australia, Radio	5995as	6020as	9475as
			9560as 9580as	9590as	12080as	15240pa
1100	1130		Iran, Voice of the Islamic Rep		15660as	17660as
1100	1130		UK, BBC World Service	6190af	11940af	
			15400af	15485af	17830af	17885af
			21470af			
1100	1157		China, China Radio Intl		5960na	13650eu
			17490na			
1100	1159	s	Germany, Overcomer Ministries	6110eu		
1100	1159	a	Germany, Universal Life	6055me		
1100	1200		Anguilla, Caribbean Beacon	11775am		
1100	1200		Australia, ABC NT Alice Springs	2310do	4835irr	
1100	1200		Australia, ABC NT Katherine	2485do		
1100	1200		Australia, ABC NT Tennant Creek	2325do		

1100	1200		Australia, HCJB	15425as		
1100	1200		Australia, Voice Intl	13635as	13685as	
1100	1200		Canada, CFRX Toronto ON		6070do	
1100	1200		Canada, CFVP Calgary AB		6030do	
1100	1200		Canada, CKZN St John's NF		6160do	
1100	1200		Canada, CKZU Vancouver BC		6160do	
1100	1200		Costa Rica, University Network	5030va	6150va	
			7375va 9725va	11870va	13750va	
1100	1200		Ecuador, HCJB	12005am	21455am	
1100	1200	vl/as	Italy, IRRS 13840va	15725al		
1100	1200	vl	Italy, IRRS 13840va	15725al		
1100	1200		Japan, Radio	6120na	9695as	11730as
1100	1200		Malaysia, Radio	7295as		
1100	1200		Malaysia, Voice of	15295as		
1100	1200		New Zealand, Radio NZ Intl		9885pa	
1100	1200		Nigeria, Voice of	15120af		
1100	1200		Papua New Guinea, Catholic Radio			4960do
1100	1200		Papua New Guinea, NBC		4890do	
1100	1200		Singapore, Radio Singapore Intl		6080as	6150as
1100	1200		South Africa, Channel Africa		11825af	
1100	1200		Taiwan, Radio Taiwan Intl		7445as	
1100	1200		UK, BBC World Service		6195as	9740as
			11760me	11865am	15310as	15575me
			17640va	17760as	17790as	
1100	1200		Ukraine, Radio Ukraine Intl		15675eu	
1100	1200		USA, AFRTS	4319usb	5446usb	5765usb
			7590usb	7812usb	12133usb	12579usb
			12133usb	12579usb	13362usb	13855usb
1100	1200		USA, KALJ Dallas TX	5755na		
1100	1200		USA, KTNB Salt Lake City UT		7505na	
1100	1200		USA, KWHR Naalehu HI		11555as	
1100	1200		USA, Voice of America		9705va	15205va
			17745va			
1100	1200		USA, WBCQ Kennebunk ME		5105na	
1100	1200		USA, WBOH Newport NC		5920am	
1100	1200		USA, WEWN Birmingham AL		5850na	7425na
			11875na			
1100	1200		USA, WHRI Noblesville IN		7520am	9495am
1100	1200		USA, WINB Red Lion PA		9320am	
1100	1200		USA, WJIE Louisville KY		7490am	
1100	1200		USA, WRMI Miami FL 6870am		9955am	
1100	1200		USA, WTJC Newport NC		9370na	
1100	1200		USA, WWCR Nashville TN		5070na	5765na
			5935na 15825na			
1100	1200		USA, WYFR Okeechobee FL		5950va	5985va
			7355va 9550va	9625va		
1130	1159	a	Germany, Universal Life		6055me	
1130	1200		Australia, Radio	5995as	6020as	9475as
			9560as 9580as	9590as	12080as	
1130	1200		Bulgaria, Radio	11700eu	15700eu	
1130	1200	t	UAE, Radio UNMEE	21550af		
1130	1200		UK, BBC World Service		6190af	11940af
			15485af	17830af	17885af	21470af
1145	1200	vl	Libya, Voice of Africa	17695af	21675af	21695af

1200 UTC - 8AM EDT / 7AM CDT / 5AM PDT

1200	1215	vl	Cambodia, National Radio		11940as	
1200	1230		France, Radio France Intl		17815af	21620af
1200	1230		Malaysia, Voice of	15295as		
1200	1230		UAE, AWR Africa	15135as		
1200	1230		Uzbekistan, Radio Tashkent		7285as	15295as
			17775as			
1200	1257		China, China Radio Intl		9730as	9795pa
			11760pa	11980as	11760pa	13790eu
			15415pa	17490eu		
1200	1257		Netherlands, Radio	11675na		
1200	1257	as	Netherlands, Radio	15725na		
1200	1259		Canada, Radio Canada Intl		9660as	15170as
1200	1259		New Zealand, Radio NZ Intl		9885pa	
1200	1259		Poland, Radio Polonia	9525eu	11850eu	
1200	1300		Anguilla, Caribbean Beacon		11775am	
1200	1300		Australia, ABC NT Alice Springs		2310do	4835irr
1200	1300		Australia, ABC NT Katherine		2485do	
1200	1300		Australia, ABC NT Tennant Creek		2325do	
1200	1300		Australia, HCJB	15425as		
1200	1300		Australia, Radio	5995as	6020as	9475as
			9560as 9580as	9590as		
1200	1300		Australia, Voice Intl	13635as	13685as	
1200	1300		Canada, CBC Northern Service		9625do	
1200	1300		Canada, CFRX Toronto ON		6070do	
1200	1300		Canada, CFVP Calgary AB		6030do	
1200	1300		Canada, CKZN St John's NF		6160do	
1200	1300		Canada, CKZU Vancouver BC		6160do	
1200	1300	mtwhf	Canada, Radio Canada Intl		9515am	13655am
			17800am			
1200	1300		Costa Rica, University Network		9725va	11870va
			13750va			
1200	1300		Ecuador, HCJB	12005am	21455am	
1200	1300	vl/a	Italy, IRRS 15725va			

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1200	1300		Malaysia, Radio	7295as	
1200	1300		Nigeria, Voice of	15120af	
1200	1300		Papua New Guinea, Catholic Radio		4960do
1200	1300		Papua New Guinea, NBC	4890do	
1200	1300		Singapore, Radio Singapore Intl	6080as	6150as
1200	1300		South Korea, Radio Korea Intl	9650va	
1200	1300		Taiwan, Radio Taiwan Intl	7130as	
1200	1300		UK, BBC World Service	6190af	9605am
			11760me	11865am	11940af
			15485af	15565eu	15575me
			17640me	17830me	17885af
1200	1300		USA, AFRTS	4319usb	5446usb
			7590usb	7812usb	12133usb
			12133usb	12579usb	13362usb
			USA, KALJ Dallas TX	5755na	
1200	1300		USA, KNLS Anchor Point AK	9780as	
1200	1300		USA, KTBN Salt Lake City UT	7505na	
1200	1300		USA, KWHR Naalehu HI	11555as	
1200	1300		USA, Voice of America	6160va	9645va
			9760va	15240va	
1200	1300		USA, WBCQ Kennebunk ME	5105na	9330na
			17495na		
1200	1300		USA, WBOH Newport NC	5920am	
1200	1300		USA, WEWN Birmingham AL	5850na	7425na
			11875na		
1200	1300		USA, WHRA Greenbush ME	15310na	
1200	1300	as	USA, WHRI Noblesville IN	9840am	11785am
1200	1300		USA, WINB Red Lion PA	9320am	
1200	1300		USA, WJIE Louisville KY	7490am	
1200	1300		USA, WRMI Miami FL 6870am	9955am	
1200	1300		USA, WTJC Newport NC	9370na	
1200	1300		USA, WWCR Nashville TN	7465na	13845na
			9985na	15825na	
1200	1300		USA, WYFR Okeechobee FL	5950na	5985na
			17505na	17750na	
1205	1220	m	Austria, Radio Austria Intl		6155va
			17715va		13730va
1215	1230	twhf	Austria, Radio Austria Intl		17715va
1215	1300		Egypt, Radio Cairo	17835as	
1230	1245	h	Germany, Bible Voice Broadcasting	12065as	
1230	1245	mtwhf	Guam, TWR/KTWR	11750as	
1230	1258		Vietnam, Voice of	9840as	12020as
1230	1300		Australia, HCJB	15405as	
1230	1300		Bangladesh, Bangla Betar	7185as	
1230	1300	s	Germany, Bible Voice Broadcasting	5890as	
1230	1300		Sri Lanka, SLBC	6005as	15745as
1230	1300		Sweden, Radio	13580va	15240na
1230	1300		Thailand, Radio	9600va	9810va
1230	1300		Turkey, Voice of	15225eu	15535va
1230	1300	a	UK, Wales Radio Intl	17745pa	
1235	1300	as	Austria, Radio Austria Intl		17715va
1245	1300	twhf	Austria, Radio Austria Intl		6155eu
			17715va		13730eu

1300 UTC - 9AM EDT / 8AM CDT / 6AM PDT

1300	1315	s	Germany, Bible Voice Broadcasting	5890eu	
1300	1320	DRM	Canada, Radio Canada Intl	7240eu	
1300	1329		Canada, Radio Canada Intl	9660as	15170as
1300	1329		Czech Rep, Radio Prague Intl	13580eu	21745af
1300	1330		Ecuador, HCJB	12005am	21455am
1300	1330		Egypt, Radio Cairo	17835as	
1300	1335		Turkey, Voice of	15225eu	15535va
1300	1357		China, China Radio Intl	9795pa	11760pa
			11900pa	11980as	13610eu
			17490eu	15180as	13790eu
1300	1357	DRM	China, China Radio Intl		7250va
1300	1400		Anguilla, Caribbean Beacon	11775am	11810va
1300	1400		Australia, Radio	5995as	6020as
			9580pa	9590pa	9560pa
1300	1400		Australia, Voice Intl	13635as	13685as
1300	1400		Canada, CBC Northern Service	9625do	
1300	1400		Canada, CFRX Toronto ON	6070do	
1300	1400		Canada, CFVP Calgary AB	6030do	
1300	1400		Canada, CKZN St John's NF	6160do	
1300	1400		Canada, CKZU Vancouver BC	6160do	
1300	1400	as	Canada, Radio Canada Intl	9515am	13655am
			17800am		
1300	1400		Costa Rica, University Network	9725va	11870va
			13750va		
1300	1400		Germany, Deutsche Welle		6140eu
1300	1400	vl/a	Italy, IRRS 15725va		
1300	1400		Jordan, Radio	11690na	
1300	1400		Malaysia, Radio	7295as	
1300	1400		New Zealand, Radio NZ Intl		6095pa
1300	1400		Nigeria, Voice of	15120af	
1300	1400		North Korea, Voice of		4405eu
			9325na	11710na	12015eu
1300	1400		Papua New Guinea, Catholic Radio		4960do
1300	1400		Papua New Guinea, NBC	4890do	

1300	1400		Romania, Radio Romania Intl	11830eu	15105eu
1300	1400		Singapore, Radio Singapore Intl	6080as	6150as
1300	1400		South Korea, Radio Korea Intl	9570as	9770as
1300	1400		Sri Lanka, SLBC	6005as	11930as
1300	1400		UK, BBC World Service		6190af
			9740as	11760me	11940af
			15420af	15485af	15190am
			17640va	17760as	15565va
			17885af	21470af	17790as
1300	1400		USA, AFRTS	4319usb	5446usb
			7590usb	7812usb	5765usb
			12133usb	12579usb	12133usb
			12579usb	13362usb	12579usb
1300	1400		USA, KALJ Dallas TX	5755na	13855usb
1300	1400		USA, KTBN Salt Lake City UT		7505na
1300	1400		USA, KWHR Naalehu HI		11555as
1300	1400		USA, Voice of America	9645va	9760va
1300	1400		USA, WBCQ Kennebunk ME	5105na	97415na
			9330na	17495na	
1300	1400		USA, WBOH Newport NC	5920am	
1300	1400		USA, WEWN Birmingham AL	7425na	9955na
			15745na		
1300	1400		USA, WHRA Greenbush ME	15310na	
1300	1400	mtwhf	USA, WHRI Noblesville IN	15285am	
1300	1400		USA, WINB Red Lion PA	13570am	
1300	1400		USA, WJIE Louisville KY	7490am	
1300	1400		USA, WRMI Miami FL 6870am	15725am	
1300	1400		USA, WTJC Newport NC	9370na	
1300	1400		USA, WWCR Nashville TN	7465na	13845na
			9985na	15825na	
1300	1400		USA, WWRB Manchester TN	9320na	12170na
1300	1400		USA, WYFR Okeechobee FL	11830va	11865va
			11910va	17750va	
1330	1400	s	Australia, HCJB	15405as	
1330	1400		Guam, AWR/KSDA	11980as	
1330	1400	mwhtfa	Guam, AWR/KSDA	15275as	
1330	1400		India, All India Radio	9690as	11620as
1330	1400		Laos, National Radio	7145as	13710as
1330	1400		Sweden, Radio	15240na	15735va
1330	1400		Uzbekistan, Radio Tashkent	7285as	15295as
			17775as		

1400 UTC - 10AM EDT / 9AM CDT / 7AM PDT

1400	1415	h	Germany, Bible Voice Broadcasting	7485as	
1400	1415		Russia, FEBA	9500as	
1400	1430		Australia, Radio	5995as	6080as
			9590as	9625pa	7240as
1400	1430	mtwhf	Germany, Deutsche Welle		15725na
1400	1430		Thailand, Radio	9725as	
1400	1445	a	Germany, Pan American BC	15650me	
1400	1457		China, China Radio Intl	7405na	9560as
			9700eu	9795eu	13675as
			17630af	11765eu	13685af
1400	1459	as	Canada, Radio Canada Intl		9515am
			17800am		13655am
1400	1500		Anguilla, Caribbean Beacon		11775am
1400	1500		Australia, Voice Intl	13635as	15205as
1400	1500		Canada, CBC Northern Service	9625do	
1400	1500		Canada, CFRX Toronto ON	6070do	
1400	1500		Canada, CFVP Calgary AB	6030do	
1400	1500		Canada, CKZN St John's NF	6160do	
1400	1500	DRM	Canada, CKZU Vancouver BC	6160do	
1400	1500		China, China Radio Intl	9610va	
1400	1500		Costa Rica, University Network	9725va	11870va
			13750va		
1400	1500		France, Radio France Intl	9580va	15615va
1400	1500	as	Germany, Bible Voice Broadcasting	7485as	
1400	1500		Germany, Deutsche Welle	6140eu	
1400	1500		Germany, Overcomer Ministries	6110eu	13810eu
1400	1500	vl	Greece, Voice of	9375eu	9420eu
			12105eu	15630eu	9775eu
1400	1500		India, All India Radio	9690as	11620as
1400	1500	vl/a	Italy, IRRS 15725va		13710as
1400	1500		Japan, Radio	7200as	11730as
1400	1500		Jordan, Radio	11690na	11840pa
1400	1500		Malaysia, Radio	7295as	
1400	1500		Netherlands, Radio	9345as	9890as
1400	1500		New Zealand, Radio NZ Intl		11835as
1400	1500		Nigeria, Voice of	15120af	
1400	1500		Oman, Radio	15140as	
1400	1500	DRM	Russia, Voice of	9480eu	
1400	1500		Russia, Voice of	6205as	7390as
			11755as	15605as	9745as
			17645as		
1400	1500		Singapore, Mediacorp Radio	6150do	
1400	1500		South Africa, Channel Africa	11825af	
1400	1500		Sri Lanka, SLBC	6005as	11930as
1400	1500		Taiwan, Radio Taiwan Intl	15265as	15745as
1400	1500		UK, BBC World Service	6190af	6195as
			7105as	9740as	11940af
			15485af	15565va	17640va
					15310as
					17790as

Shortwave Guide



1400	1500		17830af USA, AFRTS 7590usb 12133usb USA, KAIJ Dallas TX 13815na USA, KNLS Anchor Point AK 11715na USA, KTNB Salt Lake City UT 7505na USA, KWHR Naalehu HI 11555as USA, Voice of America 9760va 15265va USA, WBCQ Kennebunk ME 9330na 17495na USA, WBOH Newport NC 5920am USA, WEWN Birmingham AL 15745na USA, WHRA Greenbush ME 15310na USA, WHRI Noblesville IN 9840am USA, WINB Red Lion PA 13570am USA, WJIE Louisville KY 7490am USA, WRMI Miami FL 6870am 15725am USA, WTJC Newport NC 9370na USA, WWCR Nashville TN 9985na 13845na 15825na USA, WWRB Manchester TN 9320na 12170na USA, WYFR Okeechobee FL 11830va 11910va 13695va 17750va Nepal, Radio 3230as 7165as Germany, Pan American BC 15650as Australia, HCJB 15390as Australia, Radio 5995as 9475as 9590pa 9625pa South Korea, Radio Korea Intl 9770eu Germany, Pan American BC 15650me	21470af 4319usb 7812usb 12579usb 13362usb 13855usb 9795as 7505na 11555as 6160va 5105na 7415na 5920am 9955na 11530na 15310na 9840am 13570am 7490am 15725am 9370na 12160na 9320na 12170na 11830va 5005as 6100as 15650as 6080as 7240as 9770eu 15650me	21660af 5446usb 12133usb 12579usb 13362usb 13855usb 9795as 7505na 11555as 6160va 5105na 7415na 5920am 9955na 11530na 15310na 9840am 13570am 7490am 15725am 9370na 12160na 9320na 12170na 11830va 5005as 6100as 15650as 6080as 7240as 9770eu 15650me	5765usb 12579usb 13362usb 13855usb 9795as 7505na 11555as 6160va 5105na 7415na 5920am 9955na 11530na 15310na 9840am 13570am 7490am 15725am 9370na 12160na 9320na 12170na 11830va 5005as 6100as 15650as 6080as 7240as 9770eu 15650me
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1500 UTC - 11AM EDT / 10AM CDT / 8AM PDT

1500	1515	s	Germany, Pan American BC Russia, FEBA Hungary, Radio Budapest Vietnam, Voice of 13860va Mongolia, Voice of 12015eu Sri Lanka, SLBC 6005as UK, BBC World Service 7105as 9740as 11860af 15310as 15400af 15485af 17790as 21470af 21660af South Africa, Channel Africa 17770af China, China Radio Intl 7160eu 7405na 9435eu 9525eu 9785as 13675na 17730na Netherlands, Radio 9345va 9890va 11835va Canada, Radio Canada Intl 9515am 13655am 17800am Anguilla, Caribbean Beacon 11775am Australia, HCJB 15390as Australia, Radio 5995as 9475as 9590pa 9625pa Australia, Voice Intl 11840as 13635as 15205as Canada, CBC Northern Service 9625do Canada, CFRX Toronto ON 6070do Canada, CFVP Calgary AB 6030do Canada, CKZN St John's NF 6160do Canada, CKZU Vancouver BC 6160do Canada, Radio Canada Intl 11675as 15360as 17720as China, China Radio Intl 9610va Costa Rica, University Network 9725va 11870va 13750va Germany, Bible Voice Broadcasting 17510me Germany, Bible Voice Broadcasting 13590as Germany, Deutsche Welle 6140eu Germany, Overcomer Ministries 6110eu 13810eu Greece, Voice of 9375va 9420va 9775va 12105va 15630va Guam, TWR/KTWR 12105as Japan, Radio 6190as 7200as 9505va 11730as Jordan, Radio 11690na Malaysia, Radio 7295as New Zealand, Radio NZ Intl 6095pa North Korea, Voice of 3560af 7570eu 9335na 9990me 12015va Russia, Voice of 4965me 7325me 9810eu Singapore, Mediacorp Radio 6150do South Africa, Channel Africa 11825af	15650as 7320as 6025eu 9655eu 9840va 12020va 12015eu 6005as 6190af 6195as 11940af 12095af 15420af 15485af 21490af 17770af 7405na 17730na 9890va 11835va 9515am 13655am 11775am 15390as 5995as 9625pa 13635as 15205as 9625do 6070do 6030do 6160do 6160do 15360as 9610va 9725va 11870va 13750va 17510me 13590as 6140eu 6110eu 13810eu 9375va 9420va 9775va 12105va 15630va 12105as 7200as 9505va 11730as 11690na 7295as 6095pa 3560af 9990me 12015va 4965me 7325me 9810eu 6150do 11825af	15650as 7320as 6025eu 9655eu 9840va 12020va 12015eu 6005as 6190af 6195as 11940af 12095af 15420af 15485af 21490af 17770af 7405na 17730na 9890va 11835va 9515am 13655am 11775am 15390as 5995as 9625pa 13635as 15205as 9625do 6070do 6030do 6160do 6160do 15360as 9610va 9725va 11870va 13750va 17510me 13590as 6140eu 6110eu 13810eu 9375va 9420va 9775va 12105va 15630va 12105as 7200as 9505va 11730as 11690na 7295as 6095pa 3560af 9990me 12015va 4965me 7325me 9810eu 6150do 11825af	5765usb 12579usb 13362usb 13855usb 9795as 7505na 11555as 6160va 5105na 7415na 5920am 9955na 11530na 15310na 9840am 13570am 7490am 15725am 9370na 12160na 9320na 12170na 11830va 5005as 6100as 15650as 6080as 7240as 9770eu 15650me
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1500	1600	vl/ mtwhf	UK, BBC World Service UK, Sudan Radio Service USA, AFRTS 7590usb 12133usb USA, KAIJ Dallas TX 13815na USA, KJES Vado NM 11715na USA, KTNB Salt Lake City UT 15590na USA, KWHR Naalehu HI 11555as USA, Voice of America 7125va 9825va 9850af 15195va 15445va 15580af USA, WBCQ Kennebunk ME 5105na 7415na 9330na 17495na USA, WBOH Newport NC 5920am USA, WEWN Birmingham AL 9955na 11530na 15745na USA, WHRA Greenbush ME 17640na USA, WHRI Noblesville IN 12020am 15285am USA, WINB Red Lion PA 13570am USA, WJIE Louisville KY 7490am USA, WRMI Miami FL 6870am 15725am USA, WTJC Newport NC 9370na USA, WWCR Nashville TN 9985na 13845na 15825na USA, WWRB Manchester TN 9320na 12170na USA, WYFR Okeechobee FL 11830va 11910va 15520va 15770va Austria, Radio Austria Intl 13775na Austria, Radio Austria Intl 13775na Austria, Radio Austria Intl 13775na Russia, FEBA 7320as Germany, Pan American BC 11610as Germany, Pan American BC 15650me Germany, Bible Voice Broadcasting 17510as Germany, Bible Voice Broadcasting 13590me Iran, Voice of the Islamic Rep 9635as 11650as Russia, FEBA 9850as Russia, TWR 7535eu 7560as South Korea, Radio Korea Intl 15725na UAE, AWR Africa 15225as UK, BBC World Service 12095af 15400af 15485af 21470af 21660af USA, Voice of America 9760va 9845va 12040va 15550va Austria, Radio Austria Intl 13775na Germany, Bible Voice Broadcasting 13590me Austria, Radio Austria Intl 13775na Austria, Radio Austria Intl 13775na Germany, Bible Voice Broadcasting 13590me Germany, Pan American BC 15650me	1555eu 1557me 15530va 5446usb 5765usb 12133usb 12579usb 13362usb 13855usb 15590na 11555as 7125va 9825va 15580af 5105na 7415na 9330na 17495na 5920am 9955na 11530na 15745na 17640na 12020am 15285am 13570am 7490am 15725am 9370na 9985na 13845na 15825na 9320na 12170na 11830va 11910va 15520va 15770va 13775na 13775na 13775na 7320as 11610as 15650me 17510as 13590me 9635as 11650as 9850as 7535eu 7560as 15725na 15225as 6190af 11940af 15485af 21470af 6160va 9590va 15550va 13775na 13590me 13775na 13775na 13590me 15650me	1555eu 1557me 15530va 5446usb 5765usb 12133usb 12579usb 13362usb 13855usb 15590na 11555as 7125va 9825va 15580af 5105na 7415na 9330na 17495na 5920am 9955na 11530na 15745na 17640na 12020am 15285am 13570am 7490am 15725am 9370na 9985na 13845na 15825na 9320na 12170na 11830va 11910va 15520va 15770va 13775na 13775na 13775na 7320as 11610as 15650me 17510as 13590me 9635as 11650as 9850as 7535eu 7560as 15725na 15225as 6190af 11940af 15485af 21470af 6160va 9590va 15550va 13775na 13590me 13775na 13775na 13590me 15650me	5765usb 12579usb 13362usb 13855usb 9795as 7505na 11555as 6160va 5105na 7415na 5920am 9955na 11530na 15310na 9840am 13570am 7490am 15725am 9370na 12160na 9320na 12170na 11830va 5005as 6100as 15650as 6080as 7240as 9770eu 15650me
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1600 UTC - 12PM EDT / 11AM CDT / 9AM PDT

1600	1615	mwf	Germany, Bible Voice Broadcasting Pakistan, Radio 11570va 11850af 15100va 15725va Czech Rep, Radio Prague Intl 5930eu 17485af Vietnam, Voice of 7280va 9550va 9730va 11630va 13860va Canada, Voice of NASB 11900sa Germany, Pan American BC 15650 su Guam, AWR/KSDA 11640as 11680as Guam, TWR/KTWR 12105as Iran, Voice of the Islamic Rep 9635as 11650as Jordan, Radio 11690na Myanmar, Radio 9730do Russia, FEBA 9850as New Zealand, Radio NZ Intl 6095pa China, China Radio Intl 7255eu 9435eu 9525af 9570af 11900af 17730na China, China Radio Intl 7255eu 9435eu 9525eu 9570af 11900af 17730na Anguilla, Caribbean Beacon 11775am Australia, Radio 5995as 6080as 7240as 9475as 9710as Australia, Voice Intl 11840as 13635as 15205as Canada, CBC Northern Service 9625do Canada, CFRX Toronto ON 6070do Canada, CFVP Calgary AB 6030do Canada, CKZN St John's NF 6160do Canada, CKZU Vancouver BC 6160do China, China Radio Intl 17510va Costa Rica, University Network 11870va Ethiopia, Radio 5990af 7110af 7165af 9560af 9704af 11800af France, Radio France Intl 7170af 17850af 15160af Germany, Bible Voice Broadcasting 13590me Germany, Deutsche Welle 6170as 7225as	13590me 11850af 15100va 11570va 5930eu 17485af 9550va 9730va 11900sa 15650 11680as 12105as 9635as 11650as 11690na 9730do 9850as 6095pa 7255eu 9435eu 11900af 17730na 7255eu 9435eu 11900af 17730na 11775am 6080as 7240as 13635as 15205as 9625do 6070do 6030do 6160do 6160do 17510va 11870va 7110af 7165af 11800af 7170af 17850af 15160af 13590me 7225as	13590me 11850af 15100va 11570va 5930eu 17485af 9550va 9730va 11900sa 15650 11680as 12105as 9635as 11650as 11690na 9730do 9850as 6095pa 7255eu 9435eu 11900af 17730na 7255eu 9435eu 11900af 17730na 11775am 6080as 7240as 13635as 15205as 9625do 6070do 6030do 6160do 6160do 17510va 11870va 7110af 7165af 11800af 7170af 17850af 15160af 13590me 7225as	5765usb 12579usb 13362usb 13855usb 9795as 7505na 11555as 6160va 5105na 7415na 5920am 9955na 11530na 15310na 9840am 13570am 7490am 15725am 9370na 12160na 9320na 12170na 11830va 5005as 6100as 15650as 6080as 7240as 9770eu 15650me
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Shortwave Guide



1600	1700	vl	17595as Greece, Voice of 7475va 15630va 17705va Malaysia, Radio 7295as North Korea, Voice of 3560va 11545va 9990me Russia, Voice of 6070va 11985af 9405as 12055va 11640as South Korea, Radio Korea Intl 5975va Taiwan, Radio Taiwan Intl 11815as Taiwan, Radio Taiwan Intl 9770eu UK, BBC World Service 3915as 6190af 6195as 7160as 11940af 12095va 15400af 15420af 17790as 17820af 21490af 21660af UK, Sudan Radio Service 15530va UK, Voice Africa 13820af USA, AFRTS 4319usb 7590usb 7812usb 12133usb 12579usb USA, KALJ Dallas TX 13815na USA, KJES Vado NM 11715na USA, KTBN Salt Lake City UT 15590na USA, KWHR Naalehu HI 11555as USA, Voice of America 4930af 7125va 9700va 9760va 12080va 13600va 15580af 17895va USA, WBCQ Kennebunk ME 5105na 9330na 17495na USA, WBOH Newport NC 5920am USA, WEWN Birmingham AL 11530va 15745va 13615va USA, WHRA Greenbush ME 17640na USA, WHRI Noblesville IN 12020am USA, WINB Red Lion PA 9740am USA, WINB Red Lion PA 13570as USA, WJIE Louisville KY 7490am USA, WMLK Bethel PA 9265eu USA, WRMI Miami FL 9955am USA, WTJC Newport NC 9370na USA, WWCR Nashville TN 9985na 13845na 15825na USA, WWRB Manchester TN 9320na USA, WYFR Okeechobee FL 6085va 11865va 13695va 18980va 21455va 21525va 17750va Zambia, Radio Christian Voice 4965af UK, BBC World Service 11860af Egypt, Radio Cairo 11880af Guam, AWR/KSDA 11975as Slovakia, Slovak Radio 5920eu Germany, Bible Voice Broadcasting 13590me New Zealand, Radio NZ Intl 6095pa	9420va	12105va
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1700 UTC - 1PM EDT / 12PM CDT / 10AM PDT

1700	1710	mtwh	Moldova, Radio PMR 5960eu		
1700	1720	f	Moldova, Radio PMR 5960eu		
1700	1727		Czech Rep, Radio Prague Intl 5930eu	17485af	
1700	1728		Vietnam, Voice of 9725eu		
1700	1730		France, Radio France Intl 15605af	17605af	
1700	1730		Swaziland, TWR 3200af		
1700	1745		UK, BBC World Service 3255af	6005af	
			6190af 9630af 12095af	15105af 15400af	
			15420af 17820af	17830af 21470af	
1700	1755		South Africa, Channel Africa 15325af		
1700	1757		China, China Radio Intl 6100eu	7255eu	
			9570af 11900af		
1700	1759		Poland, Radio Polonia 5965eu	7285eu	
1700	1800		Anguilla, Caribbean Beacon 11775am		
1700	1800		Australia, Radio 5995as	6080as	9475as
			9580as 9710as		
1700	1800		Australia, Voice Intl 11840as	13635as	15205as
1700	1800		Canada, CBC Northern Service 9625do		
1700	1800		Canada, CFRX Toronto ON 6070do		
1700	1800		Canada, CFVP Calgary AB 6030do		
1700	1800		Canada, CKZN St John's NF 6160do		
1700	1800		Canada, CKZU Vancouver BC 6160do		
1700	1800	DRM	China, China Radio Intl 12080va		
1700	1800		Costa Rica, University Network 11870va	13750va	
1700	1800		Egypt, Radio Cairo 11880af		
1700	1800		Eat Guinea, Radio Africa 15190af		
1700	1800	s	Germany, Bible Voice Broadcasting 13590me		
1700	1800	vl	Greece, Voice of 7475va	9420va	12105va
			15630va 17705va		
1700	1800		Japan, Radio 9535va	11970eu	15355af
1700	1800		Malaysia, Radio 7295as		

1700	1800		New Zealand, Radio NZ Intl 6095pa		
1700	1800		Nigeria, Voice of 15120va		
1700	1800		Russia, Voice of 7390eu	9405as	9820eu
			9890eu 11510af 11985af		
1700	1800	as	Russia, Voice of 11675eu		
1700	1800		UK, BBC World Service 3915as	5975as	
			6195eu 7160as 9510as	12095va	15310as
			15565va		
1700	1800	vl/ mtwhf	UK, Sudan Radio Service 11715va		
1700	1800		UK, Voice Africa 13820af		
1700	1800		USA, AFRTS 4319usb	5446usb	5765usb
			7590usb 7812usb	12133usb	12579usb
			12133usb 12579usb	13362usb	13855usb
1700	1800		USA, KALJ Dallas TX 13815na		
1700	1800		USA, KTBN Salt Lake City UT 15590na		
1700	1800		USA, KWHR Naalehu HI 11555as		
1700	1800		USA, Voice of America 6160va	7125va	
			9345va 9850af 15410af	15580af	
1700	1800		USA, WBCQ Kennebunk ME 5105na	7415na	
			9330na 17495na		
1700	1800		USA, WBOH Newport NC 5920am		
1700	1800		USA, WEWN Birmingham AL 5810va	11530va	
			15745va		
1700	1800		USA, WHRA Greenbush ME 17640na		
1700	1800		USA, WHRI Noblesville IN 15285am	15785am	
1700	1800	as	USA, WINB Red Lion PA 9740am		
1700	1800		USA, WJIE Louisville KY 7490am		
1700	1800		USA, WMLK Bethel PA 9265eu	15265eu	
1700	1800		USA, WRMI Miami FL 9955am	15725am	
1700	1800		USA, WTJC Newport NC 9370na		
1700	1800		USA, WWCR Nashville TN 9985na	12160na	
			13845na 15825na		
1700	1800		USA, WWRB Manchester TN 9320na	12170na	
1700	1800		USA, WYFR Okeechobee FL 3955va	13695va	
			17795va 18980va	21455va	21680va
1700	1800	mtwhf	Zambia, Radio Christian Voice 4965af		
1700	1800		USA, WINB Red Lion PA 13570am		
1730	1745	vl	Israel, Kol Israel 9345va	15640va	
1730	1745	mtwhf	Libya, Voice of Africa 11860af		
1730	1745		UK, United Nations Radio 7150af	15495me	
			17810af		
1730	1800		Bulgaria, Radio 9500eu	11500eu	
1730	1800		Guam, AWR/KSDA 9385me		
1730	1800		Liberia, ELWA 4760do		
1730	1800		Philippines, Radio Pilipinas 11720va	15190va	
			17720va		
1730	1800		Swaziland, TWR 3200af	9500af	
1730	1800		Sweden, Radio 6065va		
1730	1800	mtwhf	USA, Voice of America 4930af	11975af	
			17895af		
1730	1800		Vatican City, Vatican Radio 11625af	13765af	
			15570af		
1740	1800	as	USA, Voice of America 4930af	11975af	
			17895af		
1745	1800		Bangladesh, Bangla Betar 7185eu		
1745	1800		India, All India Radio 7410eu	9445af	9950eu
			11620eu 11935af	13605af	15075af
			15155af 17670af		
1745	1800	vl	Libya, Voice of Africa 15220af	15615af	15660af
			17695af		
1745	1800		UK, BBC World Service 3255af	6190af	
			12095af 15105af	15400af	15420af
			17820af 17830af	21470af	

1800 UTC - 2PM EDT / 1PM CDT / 11AM PDT

1800	1815	a	Germany, Bible Voice Broadcasting 11965as		
1800	1828		Vietnam, Voice of 7280va	9730va	
1800	1829	s	Germany, Universal Life 15675af		
1800	1830	w f	Austria, AWR Europe 15280af		
1800	1830		Egypt, Radio Cairo 11880af		
1800	1830	s	Germany, Bible Voice Broadcasting 6015eu		
1800	1830		South Africa, AWR Africa 3215af	3345af	
1800	1830		Swaziland, TWR 3200af		
1800	1830		UK, BBC World Service 3255as	5975as	
			6190af 9510as 12095va	15400af 15420af	
			17830af 21470af		
1800	1850		New Zealand, Radio NZ Intl 6095pa		
1800	1857		Netherlands, Radio 6020af	9895af	11655af
1800	1859		Canada, Radio Canada Intl 9530af	9780af	
			13730af 15255af	15420af	
1800	1900		Anguilla, Caribbean Beacon 11775am		
1800	1900	mtwhf	Argentina, RAE 9690eu	15345eu	
1800	1900		Australia, Radio 6080as	7240as	9475as
			9580as 9710as		
1800	1900		Australia, Voice Intl 11685as		
1800	1900		Bangladesh, Bangla Betar 7185as		
1800	1900		Canada, CBC Northern Service 9625do		
1800	1900		Canada, CFRX Toronto ON 6070do		
1800	1900		Canada, CFVP Calgary AB 6030do		

Shortwave Guide



1800	1900		Canada, CKZN St John's NF	6160do	
1800	1900		Canada, CKZU Vancouver BC	6160do	
1800	1900		China, China Radio Intl	6100eu	12080va
1800	1900	DRM	China, China Radio Intl	12080va	
1800	1900		Costa Rica, University Network	11870va	13750va
1800	1900		Eqt Guinea, Radio Africa	15190af	
1800	1900	a	Germany, Bible Voice Broadcasting	6015s	9430me
1800	1900	s	Germany, Bible Voice Broadcasting	9430me	
1800	1900		India, All India Radio	7410eu	9950eu
			11620eu	11935af	13605af
			15155af	17670af	
1800	1900		Liberia, ELWA	4760do	
1800	1900		Malaysia, Radio	7295as	
1800	1900		Nigeria, Voice of	15120va	
1800	1900		North Korea, Voice of		
			12015eu	4405eu	7570eu
1800	1900		Philippines, Radio Pilipinas	11720va	15190va
			17720va		
1800	1900		Romania, Radio Romania Intl	9635eu	11830eu
1800	1900		Russia, Voice of	9480eu	9890eu
			11510af		
1800	1900		Taiwan, Radio Taiwan Intl	3965eu	
1800	1900		UK, BBC World Service	6195eu	9410eu
			12095me	15310me	
1800	1900		USA, AFRTS	4319usb	5765usb
			7590usb	7812usb	12579usb
			12133usb	12579usb	13855usb
1800	1900		USA, KAJI Dallas TX	13815na	
1800	1900		USA, KTNB Salt Lake City UT	15590na	
1800	1900		USA, Voice of America	4930af	9850af
			11975af	15410af	15885af
1800	1900		USA, WBCQ Kennebunk ME	5105na	7415na
			9330na17495na		
1800	1900		USA, WBOH Newport NC	5920am	
1800	1900		USA, WEWN Birmingham AL	11530va	13615va
			15695va	15745va	
1800	1900		USA, WHRA Greenbush ME	17640na	
1800	1900		USA, WHRI Noblesville IN	15285am	15785am
1800	1900	as	USA, WINB Red Lion PA	9740am	
1800	1900	mtwhf	USA, WINB Red Lion PA	13570am	
1800	1900		USA, WJIE Louisville KY	7490am	
1800	1900		USA, WMLK Bethel PA	9265eu	15265eu
1800	1900		USA, WRMI Miami FL 9955am	15725am	
1800	1900		USA, WTJC Newport NC	9370na	
1800	1900		USA, WWCR Nashville TN	9975na	12160na
			13845na	15825na	
1800	1900		USA, WWRB Manchester TN	9320na	12170na
1800	1900		USA, WYFR Okeechobee FL	13695eu	13780eu
			13800eu	17795eu	18980va
1800	1900		Yemen, Rep of Yemen Radio	9780me	
1800	1900		Zambia, Radio Christian Voice	4965af	
1815	1830	vi	Libya, Voice of Africa	9485af	11715af
			11860af	15660af	
1830	1900	vi	Greece, Voice of	7475va	12105va
			15630va	17705va	
1830	1900		Serbia & Montenegro, Intl Radio	6100eu	
1830	1900		Slovakia, Slovak Radio	5920eu	6055eu
1830	1900		South Africa, AWR Africa	9590af	
1830	1900		Turkey, Voice of	9785eu	
1830	1900		UK, BBC World Service	3255af	3915as
			6005af 6190af	9410af	12095af
			15400af	15420af	21470af
1845	1858	mtwhfa	Albania, Radio Tirana	6115eu	7210eu
1845	1900		Congo, RTV Congolaise	4765af	5985af
1851	1900		New Zealand, Radio NZ Intl	9845pa	

1900 UTC - 3PM EDT / 2PM CDT / 12PM PDT

1900	1915		Congo, RTV Congolaise	4765af	5985af
1900	1915	fs	Germany, Bible Voice Broadcasting	9430me	
1900	1920		Turkey, Voice of	9785eu	
1900	1925		Israel, Kol Israel	11605va	15615va
1900	1928		Hungary, Radio Budapest	3975eu	6025eu
1900	1928		Vietnam, Voice of	7280va	9730va
1900	1929	s	Germany, Universal Life	13820me	
1900	1930	a	Germany, Bible Voice Broadcasting	9430af	
1900	1930		Lithuania, Radio Vilnius	9710eu	
1900	1930		Philippines, Radio Pilipinas	11720va	15190va
			17720va		
1900	1945		India, All India Radio	7410eu	9445af
			11620eu	11935af	13605af
			15155af	17670af	
1900	1950		New Zealand, Radio NZ Intl	9845pa	
1900	1957		China, China Radio Intl	7295af	9440af
			9585af 12080af		
1900	2000		Anguilla, Caribbean Beacon	11775am	
1900	2000		Australia, Radio	6080as	7240as
			9580as 9710as		9500as
1900	2000		Australia, Voice Intl	11685as	
1900	2000		Canada, CBC Northern Service	9625do	

1900	2000		Canada, CFRX Toronto ON	6070do	
1900	2000		Canada, CFVP Calgary AB	6030do	
1900	2000		Canada, CKZN St John's NF	6160do	
1900	2000		Canada, CKZU Vancouver BC	6160do	
1900	2000		Canada, Radio Canada Intl	17765am	
1900	2000	DRM	China, China Radio Intl	12080va	
1900	2000		Costa Rica, University Network	11870va	13750va
1900	2000		Eqt Guinea, Radio Africa	15190af	
1900	2000		Germany, Deutsche Welle	13780af	15520af
1900	2000	vi	Ghana, Ghana BC Corp	3366do	4915do
1900	2000	vi	Italy, IRRS 5775va		
1900	2000		Liberia, ELWA	4760do	
1900	2000		Malaysia, Radio	7295as	
1900	2000		Namibia, Namibian BC Corp	3270do	3290do
			6060do	6175do	
1900	2000	as	Netherlands, Radio	15315na	17660na
1900	2000		Netherlands, Radio	7120af	9895af
			17810af		11655af
1900	2000		Nigeria, Radio/Ibadan	6050do	
1900	2000		Nigeria, Radio/Kaduna	4770do	6090do
1900	2000		Nigeria, Radio/Lagos	3326do	4990do
1900	2000		Nigeria, Voice of	7255va	
1900	2000		North Korea, Voice of	3560va	7100eu
			11535eu	11910eu	9975eu
1900	2000		Papua New Guinea, Catholic Radio		4960do
1900	2000		Papua New Guinea, NBC	4890do	
1900	2000		Russia, Voice of	7380eu	9890eu
1900	2000		Sierra Leone, Radio UNAMSIL	6137do	
1900	2000	irreg/vl	Sierra Leone, SLBS	3316do	
1900	2000	vi	Solomon Islands, SIBC		5020do
1900	2000	m	South Africa, African Radio League	3215af	9545do
1900	2000		South Korea, Radio Korea Intl	5975va	7275eu
1900	2000	a	Sri Lanka, SLBC	6010eu	
1900	2000		Swaziland, TWR	3200af	
1900	2000		Thailand, Radio	7155eu	9840eu
1900	2000	vi	Uganda, Radio	4976do	5026do
1900	2000		UK, BBC World Service	3255af	6005af
			6190af 6195eu	9410va	9630af
			15310me	15400af	12095af
1900	2000		USA, AFRTS	4319usb	5446usb
			7590usb	7812usb	5765usb
			12133usb	12579usb	13855usb
1900	2000		USA, KAJI Dallas TX	13815na	
1900	2000		USA, KJES Vado NM	15385na	
1900	2000		USA, KTNB Salt Lake City UT	15590na	
1900	2000		USA, Voice of America	4930af	6040af
			9670va 9850af	11975af	13635va
			15410af	15445af	15580af
1900	2000		USA, WBCQ Kennebunk ME	5105na	7415na
			9330na17495na		
1900	2000		USA, WBOH Newport NC	5920am	
1900	2000		USA, WEWN Birmingham AL	11530va	13615va
			15695va	15745va	
1900	2000		USA, WHRA Greenbush ME	15665na	
1900	2000		USA, WHRI Noblesville IN	15285am	15785am
1900	2000	as	USA, WINB Red Lion PA	9740am	
1900	2000	mtwhf	USA, WINB Red Lion PA	13570am	
1900	2000		USA, WJIE Louisville KY	7490am	
1900	2000		USA, WMLK Bethel PA	9265eu	15265eu
1900	2000		USA, WRMI Miami FL 9955am	15725am	
1900	2000		USA, WTJC Newport NC	9370na	
1900	2000		USA, WWCR Nashville TN	9975na	12160na
			13845na	15825na	
1900	2000		USA, WWRB Manchester TN	9320na	12170na
1900	2000		USA, WYFR Okeechobee FL	3230af	6085af
			13695af	13800af	17795af
			18930af	18980va	
1900	2000		Zambia, Radio Christian Voice	4965af	
1900	2000	vi	Zimbabwe, ZBC Corp	5975do	
1915	1930	vi	Libya, Voice of Africa	11635af	11715af
1925	1945		Armenia, Voice of	4810eu	9965as
1930	1945	vi	Libya, Voice of Africa	11715af	
1930	2000	mtfh	Belarus, Radio	7105eu	7280eu
1930	2000	as	Germany, Bible Voice Broadcasting	9430af	
1930	2000		Iran, Voice of the Islamic Rep	7205eu	9800eu
			9925af 11660af	11670af	11860af
1930	2000		Sweden, Radio	6065va	
1935	1955		Italy, RAI Intl	5960eu	9845eu
1945	2000	vi	Rwanda, Radio	6055do	
1945	2000	DRM	Vatican City, Vatican Radio		9800na
1950	2000		Vatican City, Vatican Radio	7250eu	4005eu
			7250eu		5885eu
1951	2000		New Zealand, Radio NZ Intl	11725pa	

2000 UTC - 4PM EDT / 3PM CDT / 1PM PDT

2000	2010		Vatican City, Vatican Radio	4005eu	5885eu
			7250eu		
2000	2027		Czech Rep, Radio Prague Intl	5930eu	11600va
2000	2030		Australia, Voice Intl	11685as	

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2100 UTC - 5PM EDT / 4PM CDT / 2PM PDT

Shortwave Guide



2100	2200		USA, WRMI Miami FL 9955am	15725am	
2100	2200		USA, WTJC Newport NC	9370na	
2100	2200		USA, WWCR Nashville TN	9975na	12160na
			13845na	15825na	
2100	2200		USA, WWRB Manchester TN	9320na	12170na
2100	2200		USA, WYFR Okeechobee FL	11565va	13800va
			17725va	17795va	18980va
2100	2200		Zambia, Radio Christian Voice	4965af	
2100	2200	vl	Zimbabwe, ZBC Corp 5975do		
2105	2159		Spain, Radio Exterior Espana	9570va	9840va
2115	2130	vl	Libya, Voice of Africa 11635af		
2115	2200		Egypt, Radio Cairo 9990eu		
2130	2145	tf	UK, BBC World Service	11720am	
2130	2157		Czech Rep, Radio Prague Intl	9800af	11600na
2130	2158	mtwhfa	Albania, Radio Tirana 7120eu		
2130	2200		Australia, ABC NT Katherine	5025do	
2130	2200		Australia, ABC NT Tennant Creek	4910do	
2130	2200		Romania, Radio Romania Intl	7165eu	9535eu
			9645eu 11940na		
2130	2200		Sweden, Radio 6065va	7420va	
2130	2200		Uzbekistan, Radio Tashkent	5025eu	9545eu
			11905eu		

2200 UTC - 6PM EDT / 5PM CDT / 3PM PDT

2200	2205		Syria, Radio Damascus	12085eu	13610eu
2200	2230	DRM	Germany, Deutsche Welle	9800as	
2200	2230		India, All India Radio 7410eu	9445eu	9910pa
			9950eu 11620pa	11715pa	
2200	2230		Papua New Guinea, NBC	9675do	
2200	2230	mtwhf	Serbia & Montenegro, Intl Radio	7230pa	
2200	2245		Egypt, Radio Cairo 9990eu		
2200	2250		Turkey, Voice of 9830va		
2200	2257		China, China Radio Intl	7170eu	
2200	2257	DRM	Netherlands, Radio 15525na		
2200	2300		Anguilla, Caribbean Beacon	6090am	
2200	2300		Australia, ABC NT Alice Springs	2310do	4835irr
2200	2300		Australia, ABC NT Katherine	5025do	
2200	2300		Australia, ABC NT Tennant Creek	4910do	
2200	2300		Australia, Radio 13630as	15230as	
			15240pa	15515pa	21740pa
2200	2300		Canada, CBC Northern Service	9625do	
2200	2300		Canada, CFRX Toronto ON	6070do	
2200	2300		Canada, CFVP Calgary AB	6030do	
2200	2300		Canada, CKZN St John's NF	6160do	
2200	2300		Canada, CKZU Vancouver BC	6160do	
2200	2300		Costa Rica, University Network	13750va	
2200	2300		Eat Guinea, Radio Africa	15190af	
2200	2300		Germany, Deutsche Welle	7115as	9720as
2200	2300	vl	Ghana, Ghana BC Corp	3366do	4915do
2200	2300		Guyana, Voice of 3291do		
2200	2300		Malaysia, Radio 7295as		
2200	2300	vl	Namibia, Namibian BC Corp	3270do	3290do
			6060do	6175do	
2200	2300		New Zealand, Radio NZ Intl	15720pa	
2200	2300		Nigeria, Radio/Ibadan	6050do	
2200	2300		Nigeria, Radio/Kaduna	4770do	6090do
2200	2300		Nigeria, Radio/Lagos 3326do	4990do	
2200	2300		Papua New Guinea, Catholic Radio		4960do
2200	2300		Sierra Leone, Radio UNAMSIL	6137do	
2200	2300	irreg/ vl	Sierra Leone, SLBS 3316do		
2200	2300	vl	Solomon Islands, SIBC	5020do	9545do
2200	2300		Taiwan, Radio Taiwan Intl	15600eu	
2200	2300		UK, BBC World Service	5965as	5975am
			6195as 7105as	9605va	9740as
			15400af		11955as
2200	2300		USA, AFRTS 4319usb	5446usb	5765usb
			7590usb	7812usb	12133usb
			12133usb	12579usb	13362usb
2200	2300		USA, KAIJ Dallas TX 13815na		
2200	2300		USA, KTBN Salt Lake City UT	15590na	
2200	2300		USA, Voice of America	7215va	12140as
			15185va	15290va	17740va
			17820va		
2200	2300		USA, WBCQ Kennebunk ME	5105na	7415na
			9330na 17495na		
2200	2300		USA, WBOH Newport NC	5920am	
2200	2300		USA, WEWN Birmingham AL	9975va	11530va
			15695va	15745va	
2200	2300		USA, WHRA Greenbush ME	11765na	
2200	2300	s	USA, WHRI Noblesville IN	9840am	
2200	2300	mtwhfa	USA, WHRI Noblesville IN	15120am	15285am
2200	2300		USA, WINB Red Lion PA	13570am	
2200	2300		USA, WJIE Louisville KY	13595am	
2200	2300		USA, WRMI Miami FL 9955am	15725am	
2200	2300		USA, WRMI Miami FL 9955am	15725am	
2200	2300		USA, WTJC Newport NC	9370na	
2200	2300		USA, WWCR Nashville TN	5070na	7465na
			9985na 13845na		
2200	2300		USA, WWRB Manchester TN	9320na	12170na
2200	2300		USA, WYFR Okeechobee FL	11740va	15770va

2200	2300		Zambia, Radio Christian Voice	4965af	
2205	2230		Italy, RAI Intl	11895as	
2215	2230	vl	Croatia, Croatian Radio	9925na	
2230	2257		Czech Rep, Radio Prague Intl	7345na	9415na
2230	2259		Canada, Radio Canada Intl	9525as	9870as
			12035as		
2230	2300	as	Australia, HCJB	15525as	
2230	2300		Guam, AWR/KSDA	11850as	15320as
2230	2300		USA, Voice of America	9570va	13755va
			15145va		
2245	2300		India, All India Radio	9705as	9950as
			11645as	13605as	11620as

2300 UTC - 7PM EDT / 6PM CDT / 4PM PDT

2300	0000		Anguilla, Caribbean Beacon	6090am	
2300	0000		Australia, ABC NT Alice Springs	2310do	4835irr
2300	0000		Australia, ABC NT Katherine	5025do	
2300	0000		Australia, ABC NT Tennant Creek	4910do	
2300	0000	as	Australia, HCJB	15525as	
2300	0000		Bulgaria, Radio 9700na	11700na	
2300	0000		Canada, CBC Northern Service	9625do	
2300	0000		Canada, CFRX Toronto ON	6070do	
2300	0000		Canada, CFVP Calgary AB	6030do	
2300	0000		Canada, CKZN St John's NF	6160do	
2300	0000		Canada, CKZU Vancouver BC	6160do	
2300	0000		Costa Rica, University Network	13750va	
2300	0000		Egypt, Radio Cairo 11885na		
2300	0000		Germany, Deutsche Welle	5955as	9890as
			15135as		
2300	0000	vl	Ghana, Ghana BC Corp	3366do	4915do
2300	0000		Guyana, Voice of 3291do		
2300	0000		India, All India Radio 9705as	9950as	11620as
			11645as	13605as	
2300	0000		Malaysia, Radio 7295as		
2300	0000	vl	Namibia, Namibian BC Corp	3270do	3290do
			6060do	6175do	
2300	0000		New Zealand, Radio NZ Intl	15720pa	
2300	0000		Papua New Guinea, Catholic Radio		4960do
2300	0000		Papua New Guinea, NBC	9675do	
2300	0000		Romania, Radio Romania Intl	6140eu	7265eu
			9645eu 11940na		
2300	0000		Sierra Leone, Radio UNAMSIL	6137do	
2300	0000	irreg/ vl	Sierra Leone, SLBS 3316do		
2300	0000		Singapore, Mediacorp Radio	6150do	
2300	0000	vl	Solomon Islands, SIBC	5020do	9545do
2300	0000		UK, BBC World Service	5975am	
2300	0000		USA, AFRTS 4319usb	5446usb	5765usb
			7590usb	7812usb	12133usb
			12133usb	12579usb	13362usb
2300	0000		USA, KAIJ Dallas TX 13815na		
2300	0000		USA, KTBN Salt Lake City UT	15590na	
2300	0000		USA, Voice of America	12140as	
2300	0000		USA, WBCQ Kennebunk ME	5105na	7415na
			9330na		
2300	0000		USA, WBOH Newport NC	5920am	
2300	0000		USA, WEWN Birmingham AL	7425va	9975va
			11530va	15695va	
2300	0000		USA, WHRA Greenbush ME	7520na	
2300	0000		USA, WINB Red Lion PA	9320am	
2300	0000		USA, WJIE Louisville KY	13595am	
2300	0000		USA, WTJC Newport NC	9370na	
2300	0000		USA, WWCR Nashville TN	5070na	7465na
			9985na 13845na		
2300	0000		USA, WWRB Manchester TN	3185na	5050na
			5085na 5745na	6890na	
2300	0000		USA, WYFR Okeechobee FL	11740va	15255va
			17750va		
2300	0000		Zambia, Radio Christian Voice	4965af	
2300	2315		Nigeria, Radio/Kaduna	4770do	6090do
2300	2315		Nigeria, Radio/Lagos 3326do		
2300	2330		Australia, Radio 9660as	12080as	13620as
			13630pa	15230pa	21740pa
2300	2330		UK, BBC World Service	3915as	5965as
			6195as 9605as	9740as	11945as
			15280as		
2300	2330		USA, Voice of America	9570va	13755va
			15145va		
2300	2357		China, China Radio Intl	5975as	5990na
			6145na 7180as	11970na	
2330	0000		Australia, Radio 9660as	12080as	13620as
			13630pa	15230pa	21740pa
			17795pa	21740pa	
2330	0000		Burma, Dem Voice of Burma	9435eu	
2330	0000		Lithuania, Radio Vilnius	7325na	
2330	0000		UK, BBC World Service	9740as	11945as
			11955as	15280as	
2330	0000		USA, Voice of America	7260va	13725va
2330	2358		Vietnam, Voice of 9840as	12020va	

Most Frequently Asked Question – Answered

One of the most frequently asked questions I receive from *MT Milcom* column readers is, “How can I listen to military aircraft communications, when I don’t live close to a military base?”

While it is true that if you live close to a base you will hear a lot of milair radio traffic, all is not lost if you are not within VHF/UHF range of a military installation. You can still monitor a lot of military comms by monitoring the Federal Aviation Administration’s Air (FAA) Route Traffic Control Center (ARTCC) frequencies. But before we start exploring the world of ARTCCs, let’s briefly review the other air traffic control functions of the FAA to better understand how these facilities fit into the National Air Space system.

Aviation monitoring enthusiasts are familiar with the tower located at the local airport. These towers are manned by tower controllers and are only one part of a complex system of air traffic control (ATC) that mixes and manages all kinds of aircraft. This includes those pilots flying under visual flight rules (VFR), who provide their own separation visually once they are more than five miles from the airport; and those flying under instrument flight rules (IFR) – pilots who are managed and separated from other IFR flights from their departure point to destination by the air traffic control system.

The tower controller, also called a local controller, separates both VFR and IFR airplanes in his (or her) area. The controller is in radio contact with each aircraft and generally relies on visual contact with the aircraft to keep them separated.

Most towers also have a ground controller who provides various services to pilots while they are still on the ground. In addition, at the larger and busier airports, there might be additional local controllers (depending on the number of runways), and a second ground controller, as well as a clearance delivery controller for passing on IFR clearances without cluttering up otherwise busy local or ground control frequencies. Some facilities even have a pre-taxi controller and ramp controllers located in the tower.

For a pilot flying a VFR flight plan, contact with air traffic control often ends when leaving the tower controller’s area and doesn’t resume again until arriving near the destination airport and contacting the tower controller there. However, the hidden and far more expensive and complex part of the National Air Space system involves the other two types of FAA ATC facilities: approach and departure, and enroute air traffic control.

Approach (and departure) control can be accomplished using non-radar procedures, but it is more commonly associated with radar control. The approach and departure facility that is associated with controlling these aircraft via radar is called the Terminal Radar Approach Control (TRACON) facility. It is usually located in a large, dark room found partway down the airport control tower structure from the cab (that is the windowed area at the top of the tower) or at the base of the tower. Some of these approach/departure facilities (like the Potomac TRACON, which controls a large area of airspace in and around Washington, DC, Baltimore, Maryland, and eastern areas of Virginia), are in buildings far removed from any airport property.

The airspace which a TRACON controls is typically from the surface to 18,000 feet above ground level (AGL), and typically encompasses a radius out to 40 miles from the major airport it is serving. Obviously, the larger facilities have concomitantly larger airspace allocations and

responsibilities than smaller airports.

TRACON airspace is divided into arrival airspace, departure airspace (sometimes more than one of each), and may also have separate controllers for auxiliary airports within their airspace.

❖ ARTCCs Control Everything Else

The remainder of the nation’s airspace is controlled by 21 enroute aeronautical facilities known as Air Route Traffic Control Centers (ARTCCs), usually just identified as “center” on VHF/UHF radio frequencies. The smallest of these facilities may only cover 100,000 square miles, while the largest covers the better part of five western U.S. states. The Chicago ARTCC is one of the smallest geographically, yet it is the busiest in terms of aircraft traffic.

Like the TRACONs, ARTCC airspace is divided into several sectors based on geography. In addition, center airspace is usually stratified by altitude; typically from the ground or upper TRACON limit of 18,000 feet to 60,000 feet and above. Flight levels (altitudes) are communicated between pilots and controllers in hundreds of feet (i.e. FL240 for 24,000 feet, etc.).

Normally, altitudes from the surface to 18,000 (FL180) are called low altitude sectors. Flight levels FL240 through FL350 are known as high altitude sectors, and FL350 and above are ultra high altitude sectors.

ARTCCs are capable of direct communications with IFR air traffic within a sector on a pair of VHF/UHF frequencies. Maximum communications and radar coverage is possible at each center through the use of Remote Center Air/Ground (RCAG) sites scattered throughout the United States. A typical site consists of both VHF and UHF transmitters and receivers, and the radar system used to control aircraft in the sector or sectors served by that RCAG. There are over 793 of these RCAG sites located throughout the U.S. Though they may be several hundred miles away from the ARTCC, they are remoted to the various ARTCCs by land lines or microwave links.

Some ARTCCs have special



Courtesy FAA

radio frequencies set aside that are known as “discrete” frequencies. These frequencies are different from the ARTCC’s normal sector frequencies. They are used for controlling aircraft flying in special airspace, such as a military operating area (MOA), a designated warning or limited access area, or for IFR aircraft flying into airports not served by a TRACON. ARTCCs do provide approach and departure services into those airports.

Each ARTCC is responsible for the safe and expeditious flow of anything that flies through its airspace. As mentioned above, ARTCCs are separated into between 21 and 65 sectors that have been carved out of the ARTCC’s airspace, both horizontally and vertically.

Each of these ARTCC sectors is equipped at the center with one radar scope, one assistant controller position, and is manned by between one to three air traffic controllers, depending on the complexity and traffic volume at a given time in that sector.

Generally five to eight sectors comprise what is called an “area of specialization.” Up to nine of these “areas” make up each ARTCC. An ARTCC controller is certified to work all sectors in any one area and, normally, controllers do not work sectors in other areas without extensive retraining.

❖ Time for an ARTCC update

It has been a long time since we have updated our FAA ARTCC frequency list published in *MT*. So, starting with this issue of *Milcom* we will present the first of our newly compiled list of ARTCC frequencies. Please note that we will not carry an ARTCC frequency list in this column if world events warrant covering other material. So please be patient and we will get around to the ARTCC covering your area as soon as space and events allow.

This month we kick off our listings of ARTCCs with Atlanta Center (Table One) that serves the world’s second busiest airport – Hartsfield-Jackson International Airport in Atlanta, Georgia. One of the busiest en route air traffic corridors in the world is controlled by the Atlanta ARTCC, and it is responsible for feeding aircraft traffic into Hartsfield-Jackson International. It is known as the Northeast Atlanta Macey Arrival. You can even monitor this sector’s VHF frequency of 121.350 MHz on the internet A near realtime feed of their air-to-ground communications and current controller radar picture of aircraft traffic north, northeast and east of Atlanta is available at <http://atcmonitor.com/>

One other thing you should remember is that you won’t be able to monitor the ground side of the air-to-ground communications unless you are close to one of the RCAGs listed below. You will, however, be able to hear the aircraft side of the communications at a much further distance. If you are within 200 to 300 miles of one the sites listed below, plug in the RCAG VHF/UHF frequency pair for that site and get ready to monitor some of the most interesting civilian and military aircraft communications on your scanner – communications from the FAA ARTCCs.

Until next time, 73 and good hunting.

Table One: Atlanta ARTCC Frequencies

Note: all frequencies are in MHz and mode is AM.

RCAG Location	VHF/UHF	ATC Service
Albemarle, NC	133.150/251.100	Low Discrete
Anniston, AL	134.950/306.200	Low Discrete [Turkey Haven Mountain]
Athens, GA	120.425/327.150	High
	124.450/254.350	Low
	127.500/316.050	Low Discrete: Approach/Departure Services
Atlanta A, GA	135.000/317.700	Low [Austell]
	369.900	High: Tactical Support Use Frequency (FL450 and above) (Amber 5)
Augusta, GA	128.100/323.000	Low Discrete: Approach/Departure Services
Birmingham, AL	128.725/306.250	High
	134.050/261.500	Low Discrete
Black Jack Mountain, GA	127.050/370.900	Low Discrete (Marietta)
Chattanooga, TN	124.875/270.600	High
	126.675/363.100	High
	132.050/353.800	Low Discrete: Approach/Departure Services
	133.175/299.200	High
Columbus, MS	120.450/357.600	Low Discrete: Approach/Departure Services
	125.575/239.350	High
Crossville, TN	125.925/236.700	High
	132.675/279.500	Ultra High
	133.600/254.300	Low Discrete: Approach/Departure Services/AR-633A/B Refueling Anchor
Foothills, GA	124.375/380.350	High [Toccoa]
Gadsden, AL	133.800/353.700	Low Discrete: Approach/Departure Services
Glade Springs, VA	127.850/371.850	Low Discrete: Approach/Departure Services
Greensboro, NC	124.425/343.800	High
	128.800/379.200	Low
Hampton, GA	121.500/243.000	Low/High
	124.325/380.150	Ultra High
	126.475/371.950	High
	127.125/363.250	High
	128.000/343.900	Low Discrete: Approach/Departure Services
	264.200, 279.200	High: Special Sector Navy Tactical Operations
Hickory, NC	125.150/263.000	Low Discrete: Approach/Departure Services
	132.975/307.350	Ultra High
	134.550/290.200	Low Discrete
	369.900	High: Tactical Support Use Frequency (FL450 and above) (Amber 5)
Huntsville, AL	126.825/354.050	Ultra High
Jonesville, SC	119.575/257.900	Low Discrete: Approach/Departure Services
	125.025/291.750	Ultra High
Macon, GA	119.575/257.900	High
	123.950/273.600	Low Discrete: Approach/Departure Services
	126.425/335.650	High
	134.500/360.750	Low Discrete: Approach/Departure Services (SFC-FL290)
Millen, GA	135.550/343.750	Low Discrete: Approach/Departure Services
Monroeville, AL	118.550/267.900	Low Discrete: Approach/Departure Services/Camden Ridge MOA
Montgomery, AL	120.550/270.250	Low Discrete: Approach/Departure Services/Pine Hill MOA (Prattville)
	125.875/308.600	Ultra High
	128.025/290.500	High
	134.600/319.100	Ultra High
	280.100	Low/Pine Hill MOA
Mt. Oglethorpe, GA	121.350/377.050	Low Discrete [Logen Sector: Northeast Atlanta Macey Arrival]
	133.100/290.800	Low
	134.800/307.900	Low Discrete: Approach/Departure Services
Newport, TN	127.550/269.500	Low Discrete
	134.075/236.500	Ultra High
Owing, SC	123.725/327.000	High
	125.625/269.100	High
	135.350/319.250	Low Discrete: Approach/Departure Services
Pine Level, AL	243.000	Low/High
	307.150	High/Birmingham MOA
	335.600	Low
	369.900	High: Tactical Support Use Frequency (FL450 and above) (Amber 5)
Sugarloaf Mountain, GA	132.625/281.100	Low Discrete: Approach/Departure Services
Tri City, TN	120.275/354.150	High [Damascus]
	126.775/301.400	High
	132.900/319.900	Low Discrete: Approach/Departure Services
Uniontown, AL	132.250/297.400	Low Discrete: Approach/Departure Services/Birmingham MOA
	133.250/339.100	Low/Birmingham MOA
	252.900, 352.800	Low/Birmingham MOA

Additional Atlanta ARTCC frequencies monitored (RCAG unknown): 119.350 125.825 126.625 135.800 MHz

State-by-State Through the South

Our AM DX tour of North America has reached the American South. Dixie is home to some 50,000-watt powerhouses, but some of the region's larger states can be surprisingly difficult to DX. Here goes:

Virginia:

The big signal from Virginia is WRVA-1140, Richmond. At 50,000 watts non-directional, this news/talk station should be easily heard most nights anywhere east of the Rockies. If for some reason WRVA doesn't make the trip to your location, Virginia is also home to an expanded-band station, WHKT-1650 Portsmouth. Unfortunately, this is a Radio Disney outlet that will be difficult to identify.

North Carolina:

The Tarheel State has two 50,000-watt stations. Both are directional at night, but their patterns are not all that tight. WPTF-680 Raleigh and WBT-1110 Charlotte are both news/talk stations. If you're west of the Carolinas, try these stations at sunrise and sunset. There's also an all-sports station on 1660 in the expanded band in Charlotte.

South Carolina:

South Carolina is a lot tougher than its northern neighbor. I've had the most success with sunrise reception of two daytime-only stations, WLFJ-660 Greenville (religious) and WCEO-840 Columbia (news/talk, but a format change is rumored). I also frequently hear news/talk WSCC-730 and black gospel WXTG-1390, both Charleston.

Georgia:

WSB-750 is the Peach State's 50,000-watt non-directional station. Georgia is also home to three expanded-band stations: news/talk WRDW-1630 Augusta; talk WMWR-1670 Dry Branch (Macon); and Air America WWAA-1690 Avondale Estates (Atlanta). Daytime-only stations WHGH-840 Thomasville (urban) and WDGR-1210 Dahlgonega (ethnic) are often heard at sunset; Spanish-language WAZX-1550 is frequently reported.

Florida:

For such a populous and important state, Florida is surprisingly difficult to DX. The state has three 50,000-watt stations but all three are directional offshore. One, WAQI-710 Miami, broadcasts in

Spanish. There's a high-powered Cuban station on the same frequency, so you cannot assume Spanish on 710 is Miami. WINZ-940 is Air America and has made the trip to Nashville a few times. News/talk WOKV-690 Jacksonville is a good sunrise/sunset bet. WOKV also tends to stay on day facilities at night when hurricanes threaten Florida's East Coast; when this happens, the station is very easy to DX pretty much anywhere in the East.

Florida is home to four expanded-band stations. WJCC-1700 Miami and WLAA-1680 Winter Garden (Orlando) are Spanish-language stations. WCNZ-1660 Marco Island is business news. WNRN-1620 Gulf Breeze (Pensacola) is reported relaying various Pensacola FM stations, most notably WYCT-98.7 "Cat Country."

Kentucky:

Louisville news/talk WHAS-840 is the big signal from here. WPAD-1560 Paducah (easy listening) is often heard by DXers. A bit more difficult but commonly heard are Lexington news/talk stations WVLK-590 and WLAP-630; and Louisville talkers WGTK-970 and WKJK-1080.

Tennessee:

Music City is home to two 50,000-watt stations. WSM-650 is the home of the famous Grand Ol' Opry, and one of the last clear channel music stations on AM. With their non-directional night signal, WSM should be audible across most of the country. News/talk WLAC-1510 goes directional at night, but with a fairly loose pattern. They, too, are worth looking for throughout most of the country. Three other good targets in the Volunteer State are Memphis religious station WMQM-1600 (50,000 watts daytime only) and Knoxville stations WRJZ-620 (religious) and WNOX-990 (news/talk).

Alabama:

At night, your best bet for Alabama is probably the state's expanded-band station,

WEUV-1700 Huntsville (a black gospel station, simulcasting WEUP-1600). Another expanded-band station once operated on 1620 from southern Alabama, but this station has moved to Gulf Breeze, Florida (see above).

Within the traditional AM band, your best bets for Alabama are probably WAPI-1070 (news/talk) and WJOX-690 (sports), both Birmingham. Those who've been DXing for a few years may remember WTAK-1000 Huntsville's uh, unique (shall we say, not Yankee-friendly<grin>) sunset signoff announcement. The AM-1000 station is still around as WDJL. They are widely heard at signon and signoff. Also a good sunrise/sunset bet is all-sports WMSP-740 Montgomery. 50,000-watt WCKS-810 Jacksonville should be an easy catch, but is surprisingly rarely reported.

Mississippi:

For many years, your best shot at Mississippi was sunrise reception of WCPC-940 Houston. Their 50,000-watt daytime signal would blast into Wisconsin at sunrise many mornings. Just don't try to catch their puny 250-watt nighttime signal! WSAO-1140 Senatobia, just south of Memphis, is another good sunrise/sunset target. A 1550 station at Jackson used to be heard regularly up north, but this station has gone silent and returned its



WTNI-1640, your best bet for logging Mississippi.

license for cancellation.

Also, for many years, WVMJ-570 was a good option for a sunrise/sunset Mississippi logging. And like the Jackson 1550 station, WVMJ no longer exists. But here, the news is better. WVMJ hasn't disappeared completely – they've moved to the expanded band, becoming WTNI-1640. WTNI's news/talk format is probably the easiest way to catch the Magnolia State.

Here's hoping your AM dial tour of

Best bets for logging the Southern states:

Virginia:..... WRVA-1140, WHKT-1650
North Carolina:..... WPTF-680, WBT-1110
South Carolina:..... WLFJ-660, WCEO-840, WSCC-730
Georgia:..... WSB-750, WMWR-1670, WRDW-1630
Florida:..... WINZ-940, WOKV-690, WNRN-1620
Kentucky:..... WHAS-840, WPAD-1560, WVLK-590
Tennessee:..... WSM-650, WLAC-1510, WNOX-990
Alabama:..... WEUV-1700, WAPI-1070, WJOX-690
Mississippi:..... WCPC-940, WSAO-1140, WTNI-1640

Dixie will color in a few more states on your map and a few more lines in your logbook. Next time, we'll visit Texas and the Delta.

❖ DX News...

January 20th was "the night of a thousand DX Tests." Well, OK, four DX tests... On the 13th, WISN-1130 Milwaukee's Chief Engineer Kent Winrich K9EZ ran an impromptu test. It was repeated the next weekend and included co-owned WOKY-920. Both tests were widely heard. I got a definite logging on WISN with plenty of mentions of the call letters and news items including a number of Milwaukee-area landmarks. (Mentions of "Wauwatosa" and "Teutonia" leave no doubt!) I missed the Morse IDs on both stations, though others heard them. I know I had WOKY – a strong station with WOKY's nostalgia format, on a frequency normally occupied by news/talk KARN Little Rock – but didn't hear any IDs, either voice or Morse, on this frequency.

But Milwaukee wasn't the only place where DX tests were happening that night. Tests were also arranged on KEVA-1240 Evanston, Wyoming, and WTTB-1490 Vero Beach, Florida. 1240 and 1490 are "graveyard" channels, home to enormous numbers of low-powered stations and tons of interference. DXers generally don't expect to get many results on these frequencies. DXers who made that assumption on the 20th missed an opportunity to hear some exotic DX. The KEVA test was heard in Maryland! I will sheepishly admit to not trying for this test. If it could make it to Maryland it should have made it here. Wyoming is extremely rare in the East, and on 1240 kHz it's an even more exotic catch.

❖ Pirate, or not?

Back in February I wrote about "mystery station" KBXZ-1650 in Flagstaff, Arizona. This station has a website indicating it carries ESPN Radio – but there is no record of any such station in the FCC database.

Rich Polukort writes from Flagstaff, noting that he cannot hear KBXZ from his home (even with a Drake R8B). On the car radio, the station is only audible near the Northern Arizona University campus, and even there only very weakly. It sounds like KBXZ is a legal Part 15 station.

❖ Harmonics: Stations that Aren't

Over the past few years there have been numerous reports of mystery relays of shortwave stations in the upper parts of the AM broadcast band. Radio Havana on 1697; Gene Scott (presumably via KAIJ, Texas) on 1615. None of these stations acknowledged BCB relays. So who's relaying them? Nobody...!

Since the 1920s, virtually every radio sold has used Armstrong's "superheterodyne" circuit. In this circuit, incoming signals are fed to one input of a "mixer." The other input is a "dead air" signal from a "local oscillator."

The output of the mixer contains four signals: the two inputs, their sum, and their difference. The frequency of the local oscillator is chosen so that either the sum or the difference is at the selected "intermediate frequency"; this signal is amplified, converted to audio, and sent to the speaker.

So, let's say you turn your radio's dial to 1700 to listen to KTBK. You turn the knob to 1700, and the local oscillator is set to 2155 kHz. The four signals out of the mixer are:

- * 1700 kHz, the KTBK signal from the antenna,
- * 2155 kHz, the local oscillator signal,
- * 3855 kHz, the sum of the two frequencies,
- * 455 kHz, the difference of the two.

The intermediate frequency amplifier is tuned to 455 kHz – the 455 kHz signal gets through, and you hear KTBK.

But... no oscillator is perfect. All oscillators have "harmonics": they put out signals on multiples of the desired frequency. When your radio is tuned to 1700, the oscillator's desired output is on 2155. But it also has a second harmonic on $2155 \times 2 = 4310$ kHz. And a third harmonic on $2155 \times 3 = 6465$ kHz. And so on. These harmonic signals also reach the mixer.

Let's consider that third harmonic on 6465 kHz. And on a hunch, let's consider a hypothetical powerful shortwave broadcast on 6010 kHz. What are the four signals out of the mixer?

- * 6010 kHz, the hypothetical 49-meter broadcast,
- * 6465 kHz, the third harmonic of the local oscillator,
- * 12475 kHz, the sum of the two frequencies,
- * 455 kHz, the difference of the two.

Yep, there's that magic 455 number again. The intermediate frequency amplifier doesn't know the 455 kHz signal resulted from a harmonic instead of the desired 2155 kHz signal. It will happily amplify the 455 kHz signal resulting from this shortwave broadcast, and you'll hear it. (In fact, the BBC World Service broadcasts on 6010 during "prime time" – but it's in DRM which means you'll hear noise on 1700, not audio...)

Now, let's consider some "real world" examples. Radio Havana on 1697? When tuned to 1697, your local oscillator is on $1697 + 455 = 2152$ kHz. The third harmonic is $2152 \times 3 = 6456$ kHz. $6456 - 6001 = 455$ kHz; when tuned to 1697, you'll hear a shortwave station on 6001 kHz in the 49-meter band. Look in the *Shortwave Guide* under Cuba at 0100 UTC and you see – Radio Havana is using 6000 kHz. Close enough.

Gene Scott on 1615? Local oscillator is on $1615 + 455 = 2070$ kHz. $2070 \times 3 = 6210$. $6210 - 5755 = 455$. The *Shortwave Guide* shows KAIJ Dallas, TX, operating on 5755.

The magic "intermediate frequency" varies with different radios. Inexpensive radios use low frequencies near 455 kHz – 450 and 460 are other common values. Often, the intermediate frequency is specified in the radio's manual or even printed on the back. Better radios usually use a much higher fre-

quency – often on the order of 40 or 70 MHz. This puts the frequency to which the radio would "spuriously" respond a lot higher in the spectrum – also a lot easier to filter out. (With a 70 MHz intermediate frequency, the third-harmonic spurious response on a radio tuned to 1615 kHz would be in the 2-meter ham band. It's really easy to filter a 2-meter ham signal out of a receiver intended to pick up the broadcast band!)

I've considered only the third harmonic of the local oscillator here, because it's the one most likely to result in spurious responses from a popular shortwave broadcast band. Other harmonics do exist, and if a strong shortwave signal exists at the right point in the spectrum, you may well hear it in the broadcast band. Do note that the strength of these harmonics drops off quickly with the order of the multiple – the fourth harmonic is weaker than the third, the fifth is weaker still, etc. And remember that these spurious receptions are the fault of shortcomings in the receiver – the stations themselves are broadcasting only on the frequencies they're supposed to use.

❖ IBOC News

In April, I wrote "I'm not aware of any IBOC receivers selling for less than \$1,000." Charles Dube, chief engineer of WFCR in Amherst, Massachusetts, wrote with information about a couple of less-expensive options. Kenwood offers an IBOC tuner (KTC-HR100) for \$399; this must be used with a compatible analog receiver: Charles' is a KDC-MP425 which sells for \$160. Boston Acoustics is introducing a tabletop IBOC radio which will sell for \$299. And at least two other firms plan to offer IBOC receivers later this year. The Boston Acoustics set includes support for NPR's dual-program system, "Tomorrow Radio."

A number of DXers have noticed brief outages of the IBOC on a number of stations, followed by occasional nighttime IBOC operation on the same stations. IBOC is normally only allowed to operate between 6am and 6pm. Two of the stations involved have been WOAI-1200 and WLAC-1510, neither of which is known for being technically "sloppy." It is strongly suspected both stations had temporary authority from the FCC to test nighttime IBOC. (And it's my suspicion the preceding daytime IBOC outages were to make changes to the IBOC equipment.) Whatever they did differently, it didn't help. The adjacent channel interference is every bit as bad as it was.

At this writing a number of new IBOC-AM stations are reported operating, including WIP-610 Philadelphia, WTEM-980 Washington, and WOWO-1190 Fort Wayne. On the other hand, WLAC-1510's IBOC has been off the air for a couple of days...

'Till next month

Hearing anything interesting? Write me at 7540 Highway 64 West, Brasstown NC 28902-0098, or by email to dougsmith@monitoringtimes.com. Good DX!

Cold Weather Railscanning

I thought that winter was never going to end this year. We never got that much snow at one time, but it stuck around until spring in northern Indiana. It was cold, but summer is here now. I didn't get to shoot many pictures this winter with the zero degree temperatures. In fact, the geese were still flying south in March!

❖ Chasing the CF&E

A day off from work in January for Martin Luther King Day gave me an opportunity to chase trains. I caught a few trains on the Norfolk Southern and the Decatur turn on the Chicago, Fort Wayne and Eastern. This was the first day that I was able to chase the CF&E, even though it was only eight degrees F outside. The day was sunny, but it was bone chilling.



In the photo above, the train is pulling a string of hoppers just east of Adams Tower in Fort Wayne, Indiana. This train is running to the old Central Soya plant in Decatur, Indiana. The plant is now Bunge North America. The train was traveling very slowly and I almost froze solid while waiting for it to roll by.

This line was a part of the old Grand Rapids and Indiana Railroad. At one time, it ran from the Cincinnati area north through Decatur and on to Fort Wayne. Then at Adams Tower, the trains ran west to Junction Tower and on to Michigan. The line ran all the way north to Mackinaw City and ended at the boat dock. The Chief Wawatam car ferry carried freight cars across the Straits of Mackinaw to St. Ignace, connecting the GR&I with the SOO Line.

The CF&E is still using 161.070 MHz and 160.545 MHz for their operations in this area. I have been watching the Federal Communication Commission (FCC) website to see if the railroad has been issued their permanent radio frequencies.

❖ RoadRailers in Fort Wayne



In this photo, a Norfolk Southern RoadRailer heads toward Mike Tower with a string of nearly 100 trailers. I listened to the train as it approached the tower and awaited clearance on its way to St. Louis. I was tuned to 160.380 MHz for the communications with the dispatcher.

❖ Carrying Scanners in Indiana

A cautionary note: I carry my Motorola GM300 radio in the van so I can listen to the local railroad activity. It is legal for me to carry this radio in Indiana, since I am a licensed ham radio operator. In Indiana it is illegal to carry a scanner on your person or in any vehicle unless you carry a police permit or have an amateur radio license.

❖ Crossing Whistles

Have you ever sat waiting on a train at a crossing and heard the rhythm of the horn with the engineer's hand on the whistle cord? The whistle is a specific set of toots. The honks are a long, then another long, a short toot and then a long toot carried into the crossing. The locomotive engineer who began this pattern of sounds was from Fort Wayne and was the grandfather of my railroad buddy, John Reitz. John's grandfather worked for the Pennsylvania Railroad in the days of steam.

John works with me on my model railroad layout in the basement. He is National Model Railroad Association Master Model Railroader Number 316 and models a freelance railroad based on the East Broad Top Railroad in Pennsylvania.

❖ The "Hoosier Line" Railway

Modeling is one way to enjoy trains when it's too cold outside to chase the real ones. I am modeling a freelanced railroad based on the years 1945 through 1960. The railroad will have motive power painted for the Monon (The Hoosier Line), New York Central, and Erie-Lackawanna. The railroad will be named the Hoosier Lines Railway. That way I can use just about any equipment from any Indiana railroad. The reporting marks for my railroad will be HLRV.

I need to get 2-way radios for dispatching the model trains when I get the layout finished. The mainline is approximately 220 feet long with roughly 600 feet of total track on the layout. The control system is digital, and I have one 900 MHz remote radio throttle to use for controlling the locomotives. I can walk around the basement and operate the locomotives by remote control.

Some of the locomotives I own have sound units in them and realistically chuff and whistle as they operate on the railroad. The sounds are sometimes deafening! I have had to lower the volume on the locomotives, since they can be so loud as to be heard upstairs.

This is the first time I have built a large layout, and it has been fun. I have a number of buddies who come to work on the railroad with me.

❖ Steamtown Frequencies

A railfan from the Scranton, Pennsylvania, area sends along some of the channels programmed into the handheld radios used at the Steamtown National Historic Site in Scranton. Steamtown runs steam locomotives and some diesel trains. They use the trackage of the railroads in the area and also teach young railroaders skills they can use while working on the railroads.

Table 1 shows the channels and their uses. We welcome lists of railroad radio frequencies such as this for sharing with our readers.

❖ But officer, I didn't see it coming!

I was traveling home one evening and saw a train stopped down on Old Maumee Road. I got ready to shoot the power on this train awaiting clearance to roll into East Wayne Yard. As I drove around the bend in the road, I noticed three police cars and police officers



standing in the road. The locomotives were not near the signal. Then a red Mustang caught my eye. It was sitting nose-to-nose with a Norfolk Southern locomotive.

I turned around and snapped a picture of the incident but never saw an article in the newspaper about it. I did see a badly shaken woman in the back seat of one police car. I am not certain if she drove down the tracks in a stupor and hit head-on into the train or what. Luckily she appeared to be unhurt.

I was listening to the railroad channels and overheard the track supervisor call for a wrecker and then later check the tracks for damage. Once he deemed the tracks OK, the train rolled slowly into the yard.

❖ Yahoo's RailScan Group!

Check out the RailScan Group on <http://www.yahoo.com>. It is a website where railfans, or railroad enthusiasts, communications listeners, and professional railroaders chat about various aspects of North American railroad radio communications. We may converse about past, present and future topics. These topics include various commercial radio equipment used by railroads, and the use of scanners, amateur, FRS, GMRS, and MURS radio as railfanning tools. Members may also discuss the radio installations and related accessories, such as coax cable and antennas. Computer control interfaces and software are also discussed.

The group welcomes rail radio frequency updates from your location and communication-related questions from members planning vacations. Operational news pertaining to communications, such as changes to dispatcher's jurisdiction, talking detectors, APCO-25 digital, ATCS 900 MHz frequency allocations and other rail communications are discussed.

RailScan also welcomes discussions regarding the various rail scanner audio sites such as the RailScan feed on Shoutcast featuring audio from the northern New Jersey/New York City Metro area.

To listen to the RailScan live scanner audio feed on Shoutcast, members should visit <http://railscan.webhop.net> Winamp player can be downloaded also for listening to the feed. One can download the free Winamp player at

<http://www.winamp.com>.

❖ New Milwaukee Channels

Tom Heiderer from Milwaukee, Wisconsin, reports the Union Pacific is now using 161.265 MHz and 160.545 MHz at Butler Yard for general switching duties. They are also using remote control locomotives at Butler. Signs advising that "the locomotive cabs may be unoccupied" surround the yard. Does anyone have an idea what frequencies they may be using?

Tom also reports that a new short line in northwest Wisconsin, the Wisconsin Northern (a division of Progressive Rail), is using 160.350 MHz, according to people living in the area. The FCC also shows 160.380 MHz and 161.115 MHz, but nothing heard on either of these. (Ed. Note: 161.115 MHz and 160.380 MHz are used in the Minneapolis, Minnesota, area of operation of Progressive Rail.)

❖ Butler County, Kansas

William Brown from Rose Hill, Kansas, sent in the Burlington Northern Santa Fe (BNSF) Railway and Union Pacific channels he listens to in Butler County.

BNSF Railway:

160.650 Road channel - Mainline
160.560 Road: Newton to Mulvane
160.425 Road: Wellington West
160.335 Maintenance of Way
160.935 Road: Newton West

Union Pacific

160.470 Road
160.410 Road
160.740 Road
160.515 Road

We thank William for his submission "to help with your column" and ask for more of the same from other readers.

❖ Want to buy a firecracker?

Point your browser toward http://www.antenna.com/lm_cat/lmrgp25.html Antenna Specialists makes this railroad antenna and fans have nicknamed it the firecracker. A number of railroads use this type of antenna. It has unity gain, but is fairly rugged. The antenna is brass and is easily painted by the railroad to match their color schemes. The antenna is readily available to the public.

That's it for this edition. We welcome your frequency lists for the column and any anecdotes concerning railroad radio for publication here in *MT*.

Until next time, make sure you don't get sidetracked in what you do.

Table 1: Steamtown Historic Site

Channel	Railroad	Transmit MHz	Receive MHz	Usage
1	Delaware-Lackawanna	161.460	161.460	Road
2	Delaware-Lackawanna	160.320	161.460	Repeater
3	Delaware-Lackawanna	160.245	160.245	Yard
4	Delaware & Hudson	161.475	161.475	Dispatcher
5	Delaware & Hudson	161.475	161.475	Road
6	Reading & Northern	161.310	161.310	Yard
7	Reading & Northern	161.370	160.770	Road
8	Not Applicable	N/A	N/A	N/A
9	Norfolk Southern	161.070	161.070	Yard
10	Norfolk Southern	160.800	160.800	Road

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Longwave News

Welcome to another issue of *Below 500 kHz*! We have a good batch of reader mail and loggings to present this month, including some intercepts made while aboard a cruise ship in the Caribbean! Your loggings, questions or comments are always welcome by either e-mail or postal mail. With e-mail, please be sure to include something meaningful in the subject line (such as "Below 500 kHz") so I don't mistake the message for unwanted "spam."

I mentioned last month that I was exploring a simple receiver design by Klaus Betke described at <http://longwave.bei.t-online.de/lfregen.html>. While I feel this is a very useful design for its intended purpose, it does not appear to be the right solution for our needs. It is meant primarily for operation below 150 kHz, rather than in the beacon-band. It may be possible to modify the circuit for higher frequency work, but these changes would add complexity to the design and still would not allow stable AM reception, as I learned in discussions with the author. This regenerative receiver is meant to operate in oscillation-mode for use with data and time signals found below 150 kHz.

I am open to further suggestions readers may have for a simple receiver design. One approach might be to build a working receiver for the AM broadcast band, and then scale down the design for longwave reception. There are numerous circuits of this type available, and lowering the frequency should be primarily a matter of adding windings to the oscillator coil. For the time being, I am placing this project on the "back burner," but I welcome any input from readers and will report further developments here.

Cruising for Beacons

Ken Maltz (NY) took his longwave hobby to the high seas recently, and sent along the nice list of loggings shown in Table 1. Ken writes: "I recently returned from a 12-day cruise of the southern Caribbean on which I took my Sony ICF-7600G in the hope that I could do some shipboard DXing; knowing that it can be difficult to receive HF/LF stations on a large cruise ship, surrounded by so much steel. Nonetheless, I went out on our veranda, seven decks up, and managed to log several LF NDBs, using the radio's built-in ferrite loop antenna. Some of the catches were within a few miles and some within a few hundred miles. It was a lot of fun to go out on the veranda at night, rotate the radio and see what was out there!"

Thanks for writing, Ken, and for sharing your loggings. With today's smaller receivers, it is quite practical to take your hobby along while traveling, whether on land or sea. You never

know what DX you will hear when you change your listening environment.

Table 1. LF Beacon Loggings

(from S. Caribbean Cruise)

Freq. ID	Location
283 UZG	Zarago, Cuba
311 TBG	Taboga Is., Panama
330 CZM	Cozumel, Mexico
332 FIS	Fish Hook, Florida
344 ZIY	Grand Cayman, CYM
348 UHA	Havana, Cuba
356 PB	Rubin, Florida
360 KIN	Kingston, Jamaica
370 LMS	La Mesa, Honduras
375 GUA	Guatemala City, GTM
380 UCY	Cayabo, Cuba
387 SPP	San Andres, Columbia
388 AM	Picny, Florida
415 CBC	Cayman Brac, CYM
430 VA	Varadero, Cuba

156 Beacons and Counting...

Tom Wrensch, N9HR (WI) has recently discovered the fun of chasing beacons and adding entries to his logbook. He writes: "I only started chasing LF beacons this past December, and never thought that I could ever log 100 of them. I'm now up to 156 and still going. Receiving is getting tougher as the spring storms roll in. Just hearing the same beacons multiple days gives one a real sense for how propagation changes on the low frequencies."

"I also wanted to let you know that I presented a beacon hunting program at the February meeting of our local ham radio club. I now have a few converts that are just getting into beacon hunting. In my presentation, I passed around the *BeaconFinder* guide and played a few-minute clip from your cassette tape, *The Sounds of Longwave*. Our radio club is based in Watertown, Wisconsin, and has an airport with a beacon of RYV on 371 kHz. I took some photos of the transmitter, and passed them around at my presentation. I'm sending you two photos for you to have in your collection. (One is shown in Figure 1—K.C.) Keep up the great column in *MT* and 73."

Thanks for writing, Tom, and big *MT* kudos for doing a club presentation on longwave! I find that



Figure 1. Photo of Beacon RYV/371 kHz, Watertown, WI

many people, especially hams, are very interested in exploring the band, but don't know where to start in terms of equipment, reference materials, or in just understanding the behavior of the band. Club presentations are an excellent way to get folks started on this part of the spectrum.

New Hampshire Logs

We are also pleased to hear from Joe Majewski, WA1WRH (NH) who has discovered the fun of chasing and identifying beacons. Joe writes: "I've listened around in the low bands with my Sony 2010 a few times in the past, but last night from 0200Z to 0500Z I tried in earnest for the first time. I live in the SW corner of New Hampshire, at an elevation of approx 1500 feet. No special antenna was used, but I did find, with no surprise, that rotating the radio made a huge difference in reception. I've included a listing of beacons heard; for some I could find no identification on the Internet. I have tried to determine the unknown beacon frequencies as closely as I can, and have confirmed the Morse IDs."

Good to hear from you, Joe. It looks like you're off to a great start with your Sony 2010. That is an excellent rig for LF work, especially when it is connected to an external antenna. Your logs appear in Table 2 below, and I've added IDs to the ones not found online, with the exception of BCT/413. I could not find a listing for this station in any of my resources. The others were identified with the *BeaconFinder II* directory and are shown in italics.

That wraps up another month. 73, and best LW DX!

Table 2. New Hampshire Loggings

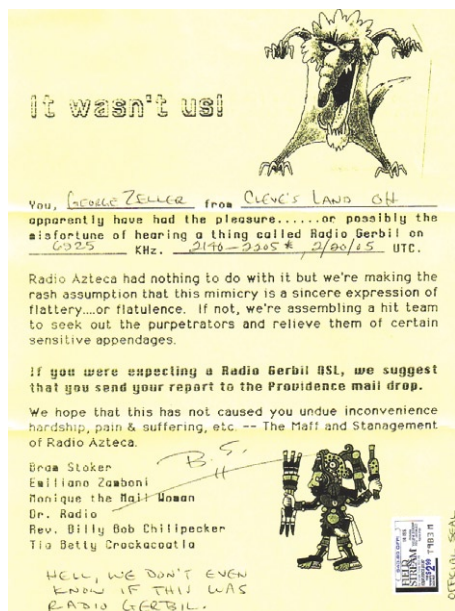
Freq.	ID	Location
205	ORE	Orange, MA
216	CLB	Wilmington, NC
248	UL	Montreal, QC
279	RS	Worcester, MA
289	YLQ	La Tuque, QC
317	ZMX	Janvier/Montreal, QC
332	BE	Bedford, MA
340	YY	Mont Joli, QC
341	YYU	Kapuskasing, ON
351	YKQ	Waskaganish, QC
359	AS	Nashua, NH
363	RNB	Millville, NJ
365	FIT	Fitchburg, MA
366	YMW	Maniwaki, QC
373	2Q	Mont Laurier, QC
375	LQ	Springfield, IL
378	RJ	Roberval, QC
392	ML	Charlevoix, QC
394	YB	North Bay, ON
404	ZYB	Yellek/North Bay, ON
414	BC	Baie Comeau, QC
415	BCT	Unidentified station
417	EK	Worcester, MA
516	YWA	Petawana, ON

The Future of Radio

Well known DXer Harry Helms has started an internet blog devoted to a discussion of the future of radio. Although the volume of postings on this blog about pirate radio is small, it is a very interesting contribution to the ongoing war between licensed local broadcasting stations, satellite radio, wi-fi, cell phones, and other rapidly evolving technologies. You can check out Harry's blog at <http://futureofradio.typepad.com/>. The blog is thought provoking, and it is well worth a visit.

❖ Radio Gerbil vs. Radio Azteca

Bram Stoker at **Radio Azteca** is probably the best producer of current pirate radio comedy in North America. Recently, another station, using a variety of identifications including **Radio Gerbil**, has been airing a very funny parody of Stoker's shows. As we see here this month, Mr. Stoker denies that he produces the parody of himself.



❖ SW Radio Africa

A new quasi-clandestine station has appeared in Zimbabwe. The latest announced schedule for the London, UK, based, independent **SW Radio Africa** is periodically updated on the station's web site, found at <http://www.swradioafrica.com/> on the internet. Their 15145

kHz broadcast for two hours at 1800 UTC has been widely heard in North America. Also, 12145 kHz from 1800-2100 UTC is worth a try. One hour at 2000 UTC on 11770 kHz is also scheduled.

At 0300 UTC their 3230 kHz frequency on 90 meters sometimes gets out to North America. For a real DX challenge, you can try 1197 kHz medium wave for two hours at 0500 UTC. At 1600 UTC they are noted on 11845 kHz as well. There have been reports that the Zimbabwe government regularly jams the **SW Radio Africa** signals.

❖ Switzerland in Sound

We have mentioned many times that the only shortwave broadcasts left in Switzerland are the pirate efforts of DJ Stevie at **Radio 510**. But, the spirit of Swiss shortwave broadcasting is still alive. Bob Zanotti, well known as half of the old "Two Bobs" on the now-defunct **Swiss Radio International**, announces that he has started a "Switzerland in Sound" web site. He continues radio feature reporting from Switzerland via the web site. You can download his reports from Switzerland at <http://www.switzerlandin-sound.com/index2.php?site=whowere.html>

Meanwhile, the Swiss government has announced substantial budget cuts to their Swissinfo web site at <http://www.swissinfo.org/> that was originally designed to replace **Swiss Radio International**.

❖ WHBH Returns?

Jacob Klee points out that somebody has been relaying old **WHBH** programming via an FM pirate on 97.7 MHz in Richmond, VA. This station used to broadcast on shortwave until it was busted by the FCC in 1990. Has anybody else been hearing this one?

❖ What We Are Hearing

Monitoring Times readers heard nearly two dozen different North American pirates this month. You can hear them, too, if you use some simple techniques. Pirate radio stations never use regular announced schedules, but shortwave pirate broadcasting increases noticeably on weekends and major holidays. You sometimes have to tune your dial up and down through the pirate radio band to find the stations, but the primary North American pirate frequency of 6925 kHz, plus or minus 30 or 40 kHz remains the best place to scan for the pirates. More than 90% of all North American shortwave pirate

broadcasts are heard on or near 6925 kHz.

Ann Hoffer Radio- They continue to feature music selections by this artist. (Uncertain; try Belfast)

Bozo Radio Network- This pirate provides rock music and inside jokes for pirate radio fans. (None)

Ground Zero Radio- Dave Gunn claims to broadcast from an abandoned missile silo. Like many other pirates he features rock music and parody material. (Elkhorn)

KRMI- They have nothing to do with **WRMI**, but instead the call letters stand for Radio Michigan International. (Elkhorn)

Pirate Radio Boston- Charlie Loudnboomer plays rock music, but given his name it is no surprise that the station also broadcasts comedy. (Uses pirateradioboston@yahoo.com e-mail)

Punxatawney Radio- Pirate radio activity always picks up around holidays. The groundhog was the inspiration for this one. (None)

Radio Novocain- This relatively new one features rock music, but it is not clear if it makes you numb. (Not known yet)

Take it Easy Radio- This veteran pirate uses the song by the Eagles as their theme song, but they also play a variety of other rock music. (Merlin and takeiteasyradio@yahoo.com e-mail)

The Crystal Ship- The Poet still sends out rock music on political commentary on a variety of unpredictable frequencies including 6925, 4071, 4510, 4700 and 6857 kHz. (Belfast and tcsshorthwave@yahoo.com e-mail)

The Mule- This odd new station claims to be a new name for the formerly obscure Government Mule Radio. (Elkhorn)

Undercover Radio- Dr. Benway mixes rock and pop music with pirate radio commentary: "from the middle of nowhere." (Merlin and uses undercoverradio@mail.com e-mail)

Voice of Captain Ron Shortwave- Captain Ron still transmits hard rock music. (Uses captainronswr@yahoo.com e-mail)

Voice of Pancho Villa- The longtime Voice of the Winter SWL Festival appeared once again in March, but you can also occasionally hear Pancho via relays by other pirates. Several years worth of shows are at <http://pix.dkosmedia.com/> (Blue Ridge Summit)

Voice of the Runaway Maharishi- The Maharishi Ali Ganja uses a rock music and drug advocacy format. (Belfast)

WEAK- Leonard Longwire still hosts the rock music and comedy on this station. (Uses weakradio69@yahoo.com e-mail)

WHGW- Old time radio dramas and rock music are the usual fare on this one. (Uses whgw6925@myway.com e-mail)

WHYP- James Brownyard is still with us from North East, PA with pirate comedy and temperatures for Lake Erie cities. (Providence)

WKIL- Jack Black is the announcer on this relatively new rock music pirate. (Unknown)

WKZP- Originally active in the late 1980s, this one has rarely been heard since 1991, but they are back with rock music. (Blue Ridge Summit)

WMPR- In what has become an annual tradition, this mysterious "Dance Party" rock music pirate once again distributed about a dozen QSLs at the March Winter Shortwave Listeners Festival in Kulpville, PA.

continued on page 61

Shaking Up the Ham Shack

Okay, I'll admit I sometimes find myself at a loss for a topic for this column. My own tendency in ham radio activity is to stick to one or two aspects for long periods of time, but nobody would want to hear me go on about the particular project I have going in my basement lab for months on end. So, in order to keep things fresh I try to keep my eyes open for new ideas. (Don't forget I welcome suggestions from readers as well.) But, right before I was ready to sit down to type up this column, a great subject, literally dropped into my lap. Or, at least, the cause of the idea did.

At this year's Kulpsville Winter SWL Fest, I was the lucky winner of one of the major door prizes, that being a Ten Tec RX320 "black box" receiver. (Many thanks to the folks at Ten Tec for making this prize available.) My good fortune put me into the position of needing to give some serious consideration to changing my station set-up. This was the first major overhaul of my operating position since moving to this location over 5 years ago.

The PC –

An uneasy stepchild becomes part of the family

A little background may be useful here. I already have one PC-controlled rig in the shack – an ICOM PC1000. This DC to daylight receiver has been a useful tool in both my HF and VHF/UHF ham activities (as well as for general radio monitoring fun). The Ten Tec RX320, with its noticeably higher performance in the HF bands, was a welcome addition. And, while I had added the computer port board to my Elecraft K2, I never really played with it that much. The same goes for my packet and PSK32 operations.

Everything was there, but it all tended to be a kludge. Up until now, I hadn't fully integrated my computer systems and my ham shack. I tended to depend on a couple of overly long "QRN Antennas" in the form of RS232 cables across the floor to my main PC. It was time to think about bringing my ham shack into the twenty-first century, even though my main operation still leaned toward good old fashioned CW on the bottom end of 40 meters.

Taking the sage advice of no less a mentor and highly experienced ham than Bob Grove W8JHD, I knew that, in most cases, a laptop computer generated less noise in the ham shack than a traditional desktop PC. I was already using a laptop around the shack, so I decided to integrate this tool into the center of my ham

operations. By placing this keyboard-based device at the center of my desk, moving my transmitters to the left and my receivers to the right (I am right handed), my station began to take on the appearance of a classic shipboard CW operator's station. Only, in my case, the laptop sat where the old "mill" typewriter used to sit.

A note on laptops that every ham and other radio monitoring hobbyist needs to consider: Modern laptops, and even modern operating systems such as Microsoft Windows 2000 and XP, aren't all that serial port friendly. Most of the radio control systems and program applications in current use still depend on the RS232 serial interface. Very few current laptops even have a serial port on them anymore. USB to serial adapters do not always work.

This is not necessarily a bad thing for a cheapskate radio hobbyist. Many great deals can be found on older laptops that are perfect for ham use. Keep an eye out and you may just find a way to modernize your shack for very little expense.

The Wires –

Access without anguish

Now, back when I started in this hobby, you really didn't have all that many wires running around the shack. An antenna, a key and/or microphone, power, ground, maybe a set of headphones. Not much to get complicated or tangled, right? Well, if your operating position is anything like mine, you may have noticed that those wires and cables behind your desk have multiplied by several factors. More than one project of mine has stalled at the gate due to a general laziness associated with needing to pull gear out to play with the wires behind it.

Since I was doing a full reassessment of my shack desktop, I began to think about how to make wire swapping and switching less of a chore. Especially since now, in addition to the

above mentioned radio connections, I had to allow for serial ports, sound card audio lines, and a few other miscellaneous connections to really take full advantage of all that my shack equipment had to offer.

Whenever I am thinking about building anything, I can move my perception "out of the box" by taking a walk around my local hardware emporium. Any dedicated free thinking builder/experimenter will tell you that many items found in hardware stores can be turned to uses never considered by their designers. Remember, we have a couple of ham satellites up there that have pie pans as part of their antenna systems. (The houseware departments can be as valuable as the hardware departments to a radio hobbyist.)

I truly love turning mundane hardware to new uses, and this project gave me just such an opportunity. I hit on the notion of making the radio equipment shelves into a single movable unit. To this end, I picked up a number of 12-inch wide by 3/4-inch thick pieces of laminated pine plus all the necessary hardware to construct an integrated section of shelving to hold my various radio toys.

Now comes the fun part. In poking around the hardware store, my eyes landed upon medium duty, ball bearing, flat drawer slides used in general cabinet making. By putting four of these ball bearing slide systems under my shelving unit and then anchoring the whole shebang to my desktop, I now had a radio position that allowed me to easily slide the shelf unit out to provide easy and ready access to the many cables and wires that hang behind the transceivers, receivers, accessories and requisite laptop computer as needed. (This is the point in the article where everybody has my full permission to place their hand on top of their head and say "Now why didn't I think of that?")

Remember folks, I've been playing with this stuff for over 30 years and I just got the idea because I was wandering down the right aisle of my local hardware store at the time my



Photos of my shack before and after the modifications

tangential mind was willing to go off in that particular direction. Coming up with new and different ways of playing radio is why this hobby is so much fun in the first place.

By building this integrated shelf unit, I was easily able to widen the radio shelf space from the 5 feet of the desktop and its adjoining file cabinet to over 6 feet. I could have gone even wider had the room's size and other furniture allowed. This extra foot of space not only gave my desktop equipment a bit more room to breathe (and eventually grow), it allowed me to move my power supplies down to the floor at the left of my desk nearer where the mains power comes into the room and directly next to my solar/battery backup system.

So now the shack set-up is more or less modular. On the left side I have the power generation all together. Above that are the main antenna switches and antenna tuners (putting them directly next to the place where the antenna feeds come into the house). This means I have the transceivers placed so their power runs and links to the antenna tuners are as short as possible. In the middle of the desk I have the laptop. And, finally, on the right I have my receivers and my handhelds fed off their own stripline power source coming over from the power section. Altogether a nice orderly way of doing radio business.

❖ Putting power in its place

Speaking of power... My shack had originally been built up around the earlier "Molex" power connector standard established for ARES/RACES radio hobby emergency service a number of years ago. That means that all of my 12 volt radio connections utilized Molex power connectors to assure standardized polarity and power capability when in the field.

Recently, a new standard has come into play – the Anderson "Power Pole" connector (<http://www.andersonpower.com>). The Power Pole system is a notable improvement over the previous way of doing business. The connectors are genderless, polarized and can be fitted to handle various power levels. The ARES/RACES standard is built around the 30 Amp connector which has been tested out to over 100 Amps, so this connector is seriously over-engineered and durable. I had built up a couple of Molex to Power Pole "Tweenies" to keep body and soul together, but, since I had the whole station wiring harness out, I figured it was time to get with the program. I bought a bunch of Power Poles and set about crimping a new wiring harness together.

I also took the opportunity to "cull the herd" a bit, moving some equipment off of the primary operating position and into backup or collector status. For example, my HW-9 is now in a place of honor with my HW-7 and HW-8, displaying the history of Heatkit QRP rigs.

❖ Final touches

Since I had everything disconnected and off the shelves (in some cases for the first time in years), it made sense to give each piece of equipment a serious visual inspection and cleaning before jamming things back onto the shack desktop. A good number of dust bunnies had in-

filtrated a few undesirable places so it was worth the time and effort to keep things functional. Needless to say, the new movable shelving will allow for easier cleaning in the future. Testing of all cables and connectors was also part of the general reconstruction of my operating position. Even high quality connectors can develop just enough corrosion to make your life miserable in the midst of a contact.

In bringing everything back together I made liberal use of surplus "snap-on" chokes, especially on keyer lines and audio cables. I suggest you use only shielded cables for all lines. I also put chokes on the power cables, but this may be a bit of overkill. I had them lying around the shack so I made use of them. In actual practice, over the years, my only experience of stray RF getting someplace it didn't belong occurred when I left a keyer line a bit too close to an open wire feed on a 80 meter dipole.

I suppose I am worried a bit less these days about stray RF than I am about transient noise between any of those many cables and my receivers. But figuring out such things is all part of the fun. I expect many sessions of signal tracing in an attempt to improve my station's overall performance. Remember, I am a ham who enjoys poking around with my gear possibly even more I enjoy getting on the air.

No two ham shacks are alike. It's fun to compare notes and come up with new ideas in order to make the ham radio hobby more enjoyable.

So what is going on here at N2EI with this new and improved operating system? Probably not a lot; summer is here and it's time for me to take my QRP portable station out on my mountain bike. There are always lots of fun things to do in the greatest hobby of all!

Have fun. I'll see you on the bottom end of forty meters, probably from somewhere in the New Jersey Pine Barrens.

UNCLE SKIP'S CONTEST CALENDAR

Asia-Pacific Summer Sprint, (SSB)
Jun 11 1100 UTC - 1300 UTC

West Virginia QSO Party
Jun 18 1600 UTC - Jun 19 0200 UTC

ARRL June VHF QSO Party
Jun 11 1800 UTC - Jun 13 0300 UTC

All Asian DX Contest, (CW)
Jun 18 0000 UTC - Jun 19 2400 UTC

SMIRK Contest
Jun 18 0000 UTC - Jun 19 2400 UTC

Kid's Day Contest
Jun 18 1800 UTC - 2400 UTC

Marconi Memorial HF Contest
Jun 25 1400 UTC - Jun 26 1400 UTC

ARRL Field Day
Jun 25 1800 UTC - 2100UTC, Jun 26

QRP ARCI Milliwatt Field Day
Jun 25 1800 UTC - Jun 26 2100 UTC

His Maj. King of Spain Contest, (SSB)
Jun 25 1800 UTC - Jun 26 1800 UTC

Outer Limits continued from Page 59

(None, has QSLed only at the Fest)
WNKR- Channel Z has been relaying this United Kingdom Europirate here in North America. (Try channelzradio@gmail.com e-mail for Channel Z)
WSPY- The pirate radio spy station still transmits an odd mix of numbers transmissions, telephone audio tones, and rock music. (None)

❖ QSLing Pirates

Reception reports to pirate stations require three first class stamps for USA maildrops or \$2 US to foreign locations, especially in Europe where the value of the US dollar is plunging rapidly. The cash defrays postage for mail forwarding and a souvenir QSL to your mailbox. Letters go to these addresses, identified above in parentheses: PO Box 1, Belfast, NY 14895; PO Box 69, Elkhorn, NE 68022; PO Box 28413, Providence, RI 02908; PO Box 109, Blue Ridge Summit, PA 17214; and PO Box 293, Merlin, Ontario N0P 1W0.

Some pirates prefer e-mail, bulletin logs or internet web site reports instead of snail mail correspondence. The best bulletins for submitting pirate loggings with a hope that pirates might QSL the logs remain *The ACE* (\$2 US for sample copies via the Belfast address above) and the e-mailed Free Radio Weekly newsletter, still free to contributors via niel@jcan.net. The Free Radio Network web site, another outstanding source of content about pirate radio, is found at <http://www.frn.net> on the internet, and a few pirates will occasionally QSL a web site report left on the FRN.

❖ Thanks

Your loggings and news about unlicensed broadcasting stations are always welcome via 7540 Highway 64 W, Brasstown, NC 28902, or via the e-mail address atop the column. We thank this month's valuable contributors: John T. Arthur, Belfast, NY; Artie Bigley, Columbus, OH; Jerry Berg, Lexington, MA; Chris Campbell, Columbus, OH; Ross Comeau, Andover, MA; Richard Cuff, Allentown, PA; Rich D'Angelo, Wyomissing, PA; Bill Finn, Philadelphia, PA; Harold Frodge, Midland, MI; William T. Hassig, Mt. Prospect, IL; Harry Helms, Wimberly, TX; Jacob Klee, Richmond, VA; Chris Lobdell, Stoneham, MA; Greg Majewski, Oakdale, CT; Larry Magne, Penn's Park, PA; Dan Malloy, Everett, MA; Mark Morgan, Cincinnati, OH; Lee Reynolds, Lempster, NH; Fred Roberts, Germany; Martin Schoech, Eisenach, Germany; John Sedlacek, Omaha, NE; Bryan Smith, Bethlehem, PA; Niel Wolfish, Toronto, Ontario, Joe Wood, Greenback, TN and Bob Zanotti, Emmental, Switzerland.

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Antenna Types: Helical Antennas

In the previous columns in this series we have discussed antennas developed by Heinrich Hertz, and also some descendants of those designs. Antennas which developed more or less independently of Hertz's work include, but are not limited to: log-periodic designs, multi-element phased arrays such as the Sturba Curtain and the Franklin phased collinear antennas, various direction-finding arrays, turnstyle, slot, horn and open-end wave guide types, the Beverage, the discone, and the helical antennas.

This month we'll take a look at the two most common helical-antenna designs.

❖ Helical Antennas

A spiral shape such as that of a coil spring is called a "helix." There are two common types of antennas made in the form of a helix. If the antenna's helical coil circumference is much smaller than one wavelength at the frequency at which the antenna operates, then the antenna will radiate perpendicularly to the axis of the helix. Such radiation is called "normal-mode," "radial mode," or "broadside" radiation. Normal-mode helical antennas are shorter and have a more narrow bandwidth than linear antennas which are resonant at the same frequency.

If the circumference of the loops of the helix is approximately one wavelength, then the antenna will radiate in both directions along its axis. If a conductive reflector is placed at one end of such an axial-mode helix (fig. 1) the antenna's radiation and reception

pattern becomes unidirectional. The pattern's major lobe is then in the direction away from the reflector through the helix. As the number of turns is increased on this antenna, its gain and directivity increase. It has a very broad bandwidth compared to an ordinary linear antenna, such as a half-wave dipole.

The size of axial-mode helical antennas makes them relatively impractical at HF and lower frequencies. They begin to become more manageable in size at VHF, and much more reasonable in size at UHF and microwave frequencies.

❖ Let's Make an Axial-Mode Helical Antenna

Equations for designing an axial-mode helical antenna are given in fig. 1.

The coil for the helix can be 1/4 inch tubing (pinch and solder the ends closed), heavy wire, or the outer conductor of coaxial cable (solder the inner conductor to the outer at both ends, or remove it). Conductors of smaller diameters have been used with good results, but give less-broad bandwidths. I found that one of the sauce pans in our kitchen made a good form to shape the circular windings of my helix.

In order to match the antenna's input impedance to a 50-ohm feed line, the helix comes off the feed point connector very close (1/8 in.) to the reflector. It then slowly raises to 1 in. at 5 in. from the connector, then to 3-3/8 in. (this is measurement "g" in fig. 1) a half-turn out from the connector.

Conductive material such as galvanized metal, aluminum or copper sheet metal, or galvanized hardware cloth can be used for the reflector. Brackets may be necessary to hold the reflector rigid. For strength my hardware cloth (1/4 in. holes) reflector was reinforced with a masonite panel.

The helix supports must be of non-conducting material such as dry wood (varnished for outside use), plastic or fiberglass. The helix supports were 3/4 x 3/4 in. wood which was held to the reflector using large sheet-metal screws with very-large washers. The windings may be kept in place on the supports using glue and notches in the supports, string, wood pegs, etc. No conductive material is used here, either. The construction you choose must fit your intended use of the antenna. Mine is used in temporary situations, and never left out in bad weather. You should use more durable construction if you plan to leave your antenna permanently outside.

The mast is of 3/4 in. thick wood, and is held to the back of the reflector bolted between two wood brackets (fig. 1).

As with any antenna, don't work on this one when it is transmitting and stay out of the path of its beam when it is transmitting. If you mount it outdoors, use some kind of lightning protection. The minimum is to never use it during weather likely to produce lightning and disconnect and ground it when it is not in use.

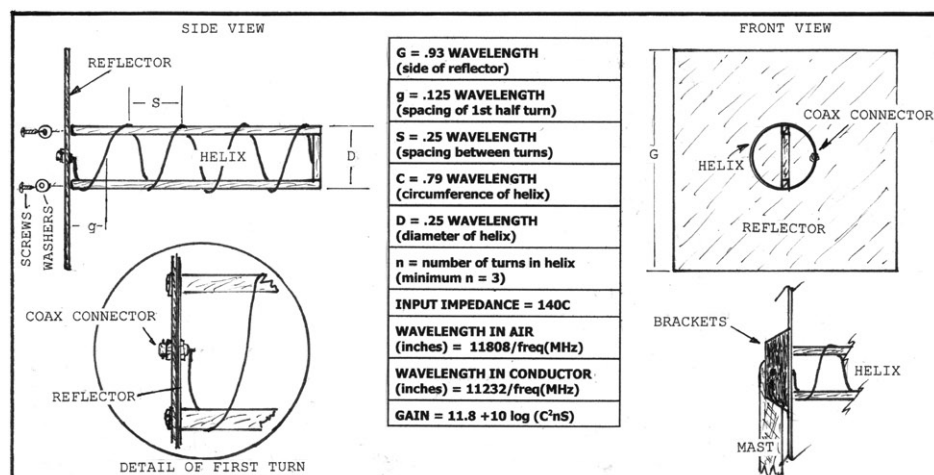


Fig. 1. An axial-mode, helical antenna with equations for determining its dimensions at the frequency at which it is to be operated.

RADIO RIDDLES

Last Month:

For last month's Radio Riddle I said: "The above discussion has been concerned with antennas receiving signals. Can the antennas we've discussed be used for transmitting as well? And if they can, will they have the same increased gain and directional performance for transmitting as they do for reception?"

To answer this let's consider something called antenna "reciprocity." This means that an antenna's performance characteristics, such as radiation-reception patterns, feed-point impedance, and radiation resistance, remain the same whether the antenna is used for transmitting or receiving. Thus, an an-

This Month's Interesting Antenna-Related Web site:

An antenna tutorial with discussion about radial antennas:

http://www.micrel.com/_PDF/App-Notes/an-23.pdf

This next one gives a good overview of antenna terms and types of antennas:

[http://encyclopedia.laborlawtalk.com/Antenna_\(electronics\)#Antenna_Effectiveness](http://encyclopedia.laborlawtalk.com/Antenna_(electronics)#Antenna_Effectiveness)

Here's a complete, free, U. S. Navy course on antennas, transmission lines, and wave propagation:

<http://www.cs.tcd.ie/Stephen.Farrell/ipn/background/US-Navy-NEETS/Module10-14182.pdf>

tenna whose radiation patterns tend to favor transmitting in certain directions will favor reception from those same directions. And an antenna, which offers its feed line 50-ohms impedance at its feed point when transmitting, will offer that same impedance for reception. And so, due to antenna reciprocity, the answer to our riddle is "yes."

It is of interest here to mention that some antennas seem to perform counter to the reciprocity principle. It's true that some antennas – for example, small "desk-top" loops and the Beverage wave antenna – serve better for reception than for transmission. These antennas with their sharp directivity and rejection of interference do function well for reception where received noise and interference are a problem (generally below 30 MHz). Their

reduction of noise and interference often improves reception a great deal. However, their interference/noise-reducing features are of no value when transmitting. Due to low gain and/or low efficiency, most antennas of these types perform poorly for most transmitting purposes. It is these features rather than any lack of reciprocity that makes them more useful for receiving than for transmitting.

It's also true that active antennas are often referred to as receive-only antennas: antennas that can't be used for transmitting. However, active antennas are, strictly speaking, not really antennas. An active antenna is a receiving preamplifier with a small antenna element attached to its input. It is the receiving preamplifier that makes them unsuitable for transmitting. The only actual "antenna" component of the active antenna is its antenna element. If this element were used without the preamplifier it would have the same characteristics for transmitting as for receiving. Just as with other antennas, the antenna element of the active antenna would obey the principle of reciprocity.

This Month:

The axial-mode helical antenna discussed this month transmits signals with what is called "circular polarization." Do all antennas with circularly shaped elements produce circular polarization? And can any antennas with non-circular elements yield circular polarization? And what is "polarization" anyhow?

You'll find an answer to this month's riddle, another riddle, another antenna-related web site or so, and much more, in next month's issue of *Monitoring Times*. 'Til then Peace, DX, and 73.

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Putting a Signal Tracer Through its Paces

Last month we completed checking out the Heathkit IT-12 and Eico 147-A signal tracers. It remained only to fabricate the required test prods before we would be in a position to try one of these units under actual operating conditions. I hope you'll forgive me for equipping and testing only the Eico instrument. The design of the Heathkit model is so similar that there would be little more to be learned from working with it. Since the Eico unit has a few more features, it's the one that will have a permanent spot on my workbench.

❖ Making the Test Probes

Unlike the Heath unit, which has a single test probe which is switchable to accommodate either r.f. or audio inputs, the Eico instrument requires a separate probe to accommodate each function. The r.f. probe has a built-in detector circuit consisting of a semiconductor diode in series with an 470k isolating resistor. It's wired, via shielded cable, to a screw connector for attachment to the r.f. input of the instrument. The cable shield is grounded to the body of the screw connector at the instrument end and, at the probe end, is connected to a spring clip for grounding to the radio chassis under test.

The audio probe contains no circuitry and is simply wired straight through, via shielded cable, to a pair of pin tips for connection to the ground (pin tip from cable shield) and audio input jacks of the 147-A. A ground lead is connected to the cable shield within the body of the probe and exits the back of the probe, where it is terminated in a spring clip for grounding to the chassis under test.

Rummaging around in my box of surplus cables, I found a couple of shielded ones that would serve very well as a basis for the test leads I was going to need. One of them already

had, at one end, a set of pin tips connected to its ground and hot lead. It would be perfect for the audio cable. I removed and saved the connector at the other end and replaced it with a spare test prod from the same junk box. The needle tip of this prod could be temporarily unscrewed from the plastic body, making it very easy to wire the cable to the tip and to the ground lead that would exit the back of the body.

The other shielded cable from the "surplus" box was very close to what I would need for the r.f. test lead. It had a screw connector of the right type for attachment to the r.f. input of the instrument. The other end was terminated in a plastic body containing a circuitry compartment from which emerged wires, with spring clips, for use as ground and "hot" connections. All I had to do was remove the old components from the compartment and replace them with the required diode and isolating resistor.

❖ Wattage Indicator Check

With the test leads completed and set aside, I began by checking the instrument's wattage indicator circuit. The idea of having a wattage indicator is to determine whether the radio being tested is drawing the power, in watts, indicated on its identification tag. If it is substantially more, then there is trouble brewing – perhaps in the form of a leaky capacitor or two.

Rather than using a radio, I plugged a lamp with a 40-watt bulb into the instrument's wattage-test outlet and set the controls appropriately. The idea is to rotate the wattage test potentiometer until the instrument's "magic eye" indicator just closes. The arrow on the pot is then supposed to point to the wattage being drawn. It pointed to 42 watts. Close enough!

❖ R.F. and A.F. Tracing

I decided to use my National NC-57 receiver to test the Eico's signal tracing function. The restoration of this receiver was just completed in the April issue and the bottom cover was still off – giving me access to all of the test points I would need. Turning on my r.f. signal generator, I used it to feed a modulated 600-kHz signal into the front end of the receiver as suggested in the Eico manual.

Hooking up the r.f. probe and setting the Eico's controls to "Trace" and "RF," I was

able to use the probe to pick up the test signal at the control grid and plate of the r.f. amplifier, mixer, and first and second i.f. stages. I could hear the signal in the test speaker and see an indication on the tuning eye at each stage – and I needed to reduce the setting of the gain control to maintain the same indication on the magic eye as I progressed through the receiver. This was an indication that the signal was being properly amplified at each stage.

There was a certain amount of hum interference present in the earlier stages of the receiver because of high setting of the gain control required to pick up the low level signals. Perhaps my test lead is a little too long. Switching to the audio probe and resetting the controls for audio tracing, I was able to pick up a clear signal at the grid and plate of the first audio and audio output tubes.

These tests were enough to satisfy me that the 147-A is in good working order and ready for use on the next service problem. For a more detailed discussion of how a signal tracer is used to isolate problems, see the discussion at the end of the April 2005 issue.

❖ The RCA/Rider Chanalyst

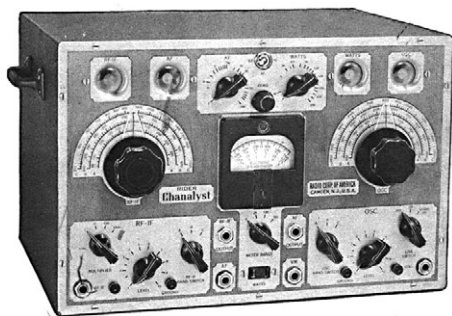
With our discussion of simple signal tracers complete, I thought you might be interested in seeing what a really advanced instrument might look like. I'm talking about the RCA/Rider Chanalyst. This was an instrument designed by radio service writer *par excellence* John F. Rider and was later marketed by RCA. The Chanalyst was introduced to the radio service trade in the late 1930s and was quite popular for several years thereafter.

Similar instruments marketed by other manufacturers were the Meissner Analyst (available in kit form) and the Hickock Tracemeter. These units looked quite different physically from the Chanalyst, and the Tracemeter used a battery of meters to monitor gain levels instead of the tuning eye indicators employed by the other units. Nevertheless, the basic circuitry and operating features of all three instruments are virtually identical.

I happen to own an example of each of these units, though I haven't gotten around to checking them out and setting one up for operation. I don't know if it would be appropriate to write up one of these up for the column because – while not exactly rare – they don't show up in flea markets and hamfests

The Eico 147-A as set up for r.f. signal tracing in the National NC-57.





You might call the RCA/Rider Chanalyst a signal tracer gone to heaven!

nearly as often as the hobby-type signal tracers we've just finished discussing. They are quite interesting, though, and this seems to be a very appropriate time for a once-over-lightly discussion.

While the Eico or Heath units we've been discussing can look at just one circuit point at a time, the Chanalyst and its relatives can look at several circuit points simultaneously – and it can monitor the action at these points in a much more sensitive and precise manner. In order to do this, it's equipped with five independent monitoring channels: the r.f.-i.f. channel, the oscillator channel, the a.f. channel, the electronic voltmeter channel, and the wattage indicator channel.

❖ Understanding the Channels

The r.f.-i.f. channel is really a complete multistage radio receiver (minus the audio amplifier). It covers the frequency range of 96 kHz to 1700 kHz – which includes most i.f. frequencies as well as the standard broadcast band. The level of the incoming signal can be measured quite precisely, over a wide range, using the channel's tuning eye and associated "level" and "multiplier" controls. Because this is a sensitive receiver rather than just a rectifier probe connected to an audio amplifier, the r.f.-i.f. channel can pick up the faintest signals present at any r.f. or i.f. stage of the radio being tested. It can even be connected directly to the

outside antenna, if the set has one, to measure the strength of the incoming signals.

The oscillator channel is also a radio receiver, but not nearly as sensitive as the r.f.-i.f. channel. Its range is 600-15000 kHz and its function is to check the level and frequency of the oscillator signal in the radio being tested. Level is indicated by means of the channel's magic-eye indicator and calibrated gain control. Frequency is read from the tuning dial. Since intermittent receiver operation is often caused by oscillator problems, it can be very handy to set up this channel to constantly monitor oscillator operation while checking the operation of the other stages of the receiver.

The audio channel is simply a single-stage, high-gain audio amplifier that can accurately measure audio voltages between 150 and 50,000 kHz. Indication is via tuning eye and calibrated level control. A two-position multiplier switch allows measurements over a range of .1 to 1000 volts with an accuracy of between 15 and 20 percent. By using the voltage measurement facility, a receiver's audio stages can be checked for proper gain.

The audio channel has a headphone output jack that can be used to monitor signals at any point in the audio system for distortion and/or hum. The r.f.-i.f. channel has a similar output jack for checking audio in the r.f. and i.f. stages.

The electronic voltmeter channel is a d.c.-only vacuum-tube voltmeter with ranges of ± 5 , 25, 125 and 500 volts. Vacuum-tube voltmeters were very rare in the 1930s and must have seemed like quite a boon to the radio serviceman owning one for the first time. Because of its extremely high input impedance, the instrument can be used to measure voltages anywhere in the radio receiver with the signal present – even at the control grids of tubes – without disturbing the operation of the radio. It could even be used to measure the voltages of Mallory bias cells (common in the late 1930s), which could not tolerate current drain in excess of a few microamperes.

Through the use of jumper cables, the electronic voltmeter can be connected to the

control grid of the r.f.-i.f. or oscillator channel magic eye tubes to give more precise indications than can be read from the calibrated level controls.

The wattage indicator channel works exactly like the wattage "channel" we checked out in the Eico 147-A. Plug the set into the special outlet, turn the calibrated control until the eye just closes, and read the wattage off the control scale. When turning on the set to be repaired for the first time, it was considered good practice to monitor its wattage and (using the electronic voltmeter), the voltage on its B-plus line. If the former was high and the latter low, there was probably a short somewhere. The set could then be immediately shut off and further testing postponed until the short was cleared.

❖ What's Next?

The Chanalyst and its relatives are interesting instruments indeed, and there is no modern equipment that can look at so many stages of a radio at once. The closest thing that might approximate it would be a dual-trace 'scope. But, even equipped with appropriate tuned circuits and detector probes, it wouldn't come close to matching the versatility of the Chanalyst, Analyst or Traceometer.

This concludes our discussion of signal tracers. What's our next project? I'm turning over a few possibilities in my mind. We might take another flyer into World War II surplus receivers, but I'm not sure. Tune in next time and find out!

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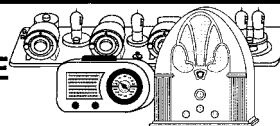
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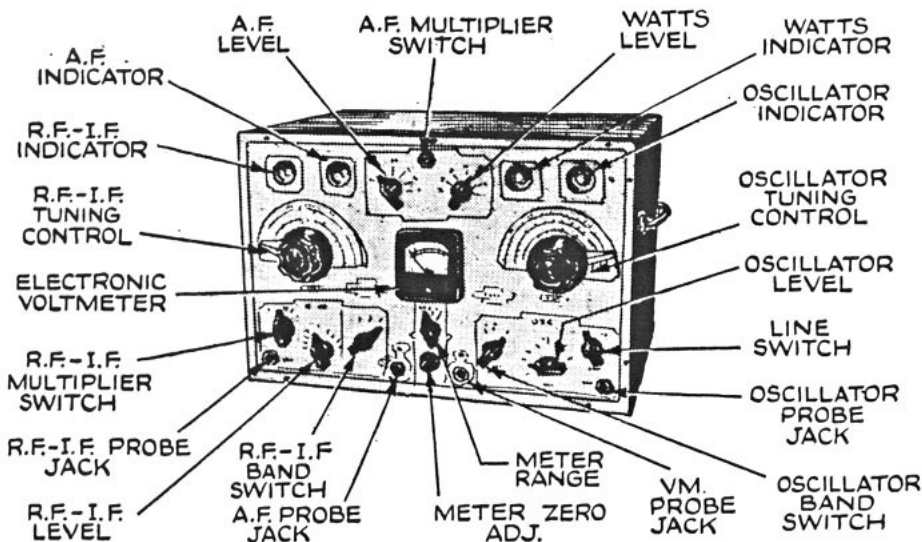
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A key to the controls and jacks on the RCA/Rider Chanalyst.

Those Strange Motorola Type II and Ericson EDACS Talkgroups

By David L. Wilson

Scanner manufacturers have spent a good deal of manual space explaining Motorola Type I trunk systems so that the scanner user can set up his scanner to understand such systems and scan the talkgroups of interest. Unfortunately, not only are Motorola Type II and Ericsson EDACS trunks systems only briefly described, the scanners themselves do not often indicate the most useful talkgroup designators (in the case of Motorola Type II) or even correctly identified designators (in the case of EDACS). For the casual listener, this information may not be of much interest; but for those interested in figuring out trunk systems, it is essential.

❖ Motorola Type II

Motorola Type II talk group numbers have mystified many scanner hobbyists for some time. Some may know they come from a set of twelve binary bits, of which the last four status bits indicate special purposes. The last bit before these in a Type II talk group is usually a 1, which is used to indicate talkgroup priority. The first three bits indicate which of the 7 blocks the talkgroup is in, for allocating that block as either Type I or Type II. But still, some mystery remains as to the rationale behind talkgroup assignments in each particular situation.

A scanner or scanning reference might show a Motorola Type II as 7D3 in hexadecimal or as 32048 in decimal. Some sources also would identify this talk group by its supposed Motorola designator 802003 (from 32048 divided by 16 plus 800000). This talkgroup is the first of a series of used talkgroups. But why did the developer start with 7D3?

Unfortunately, none of these designators give an indication of the thinking of the system designer. However, as will be seen in the following example, there is another number for this talkgroup that *does* show the thinking that led to this talkgroup assignment.

If starting with the four hexadecimal designator (example, 7D30):

1. Drop the last character (7D3)
2. Convert the hexadecimal to binary (011111010011)
3. Drop the last bit (01111101001)
4. Convert the binary to decimal (1001 – it just happens that in this particular example results in a decimal that only has 0's and 1's).

Steps 2 and 4 can be done using the MS-Windows calculator by choosing the base clicking on the left side to choose hexadecimal (Hex), decimal (Dec), or binary (Bin), then entering the number in that base; and finally clicking on the

left again to choose the desired new base.

Note that in the example, the result of 1001 is just 1 more than a thousand. The system designer decided to reserve the first 1000 talk groups for other purposes and started this set of active talk groups with 1001.

If one starts with the usual scanner decimal talkgroup designator instead (example, 32048), one does the following steps:

1. Divide by 16 and drop any remainder, as those are due to the final four status bits in the binary indicating a special purpose (2003)
2. Subtract 1 (2002)
3. Divide by 2 (1001 – the same answer we got when we converted 7D30 to decimal, so this is the same talk group).

Note that the first three possible talkgroups in a Type II system as displayed on a scanner are 16, 48, and 80, which now become 0, 1, and 2 – It now becomes evident these are the first three talkgroups in the system.

When one does the above, the first talk group in a cluster of active talkgroups is often found to be a number like 25, 26, 50, 51, 75, 76, 100, 101, etc. This is because the system developer divided up the talkgroups at the “nice” numbers of 25, 50, 75, 100 etc. to reserve space for other purposes or for expansion. Understanding this logic may aid one in deciphering the talkgroups of a Type II system.

❖ Ericsson EDACS

In the case of EDACS trunked systems, scanner manufacturers have generally allocated the EDACS AFS (Agency-Fleet-Subfleet) 11 bits as 4 agency bits (up to 16 agencies), 4 fleet bits (up to 16 fleets per agency), and 3 subfleet bits (up to 8 subfleets per fleet). This will be referred to below as AFS-4/4/3.

The problem is that systems may choose to allocate the 11 bits differently. Many systems allocated the 11 bits as 3 agency bits (up to 8 agencies), 4 fleet bits (up to 16 fleets per agency), and 4 subfleet bits (up to 16 subfleets per fleet). This will be referred to as AFS-3/4/4 in what follows. The impact of displaying as AFS 4/4/3 when the system is AFS-3/4/4 is that the AFS breakdown into agencies, fleets, and subfleets is incorrect and the logic of the designer of the system is no longer clear.

As an example, many EDACS systems on a scanner or in a scanning reference will indicate a busy talkgroup as 02-021. This is often the police or fire dispatcher. In AFS- 4/4/3, this would indicate agency 02, fleet 02, and subfleet 1. Note that 4 bits, being 0 to 15, will always be

written as 2 decimal digits; and 3 bits, being 0 to 7, will always be written as 1 decimal digit. (Thus, for example, we wrote 02 instead of 2 for the agency number above, 02 instead of 2 for the fleet above, but 1 for the subfleet.) But then what happened to agency 01, fleet 01, and subfleet 1? We will soon discover.

Let us see what happens if we allocate the bits correctly as AFS-3/4/4.

1. First, break the AFS 4/4/3 designator into agency, fleet, and subfleet: 02-021 becomes 02-02-1
2. Now convert these to binary where 2 digits become 4 bits and 1 digit becomes 3 bits (use the MS Windows calculator if needed): 0010 0010 001
3. Now regroup the AFS-4/4/3 as AFS-3/4/4: 001 0001 0001
4. Convert the binary back to decimal (base 10) (again using the MS-Windows calculator if needed and using 1 decimal digit for 3 bits and 2 decimal digits for 4 bits): 1 01 01
5. Finally, as has been the tradition, place a dash after the agency and concatenate the fleet and subfleet: 1-0101

We have now discovered that our 02-021 is actually agency 1, fleet 1 and subfleet 1, not agency 02, fleet 02, as the 02-021 would lead us to think when it incorrectly grouped the bits between agency, fleet and subfleet.

Rewriting the talkgroup designators with the bits correctly allocated in AFS will often show the logic of the system's designer in setting up the various talkgroups in the system.

Finally, a quick look at information on the net may indicate that in some areas AFS-2/4/5, AFS-3/3/5, or AFS-3/5/3 are in use. It should be apparent how to modify Step 2 above to take care of these. If the agency, fleet and subfleet numbers seem strange for your system, it will be worthwhile to experiment to find the correct one to enable you to determine possible users of newly discovered talkgroups. An abundance of even numbered agency or fleet numbers is often an indication that the displayed AFS is not correct.

In conclusion, a little experimenting to determine the talkgroup number that the system designer used in designing a Motorola Type II system (or the correct agency-fleet-subfleet, in the case of an Ericsson EDACS system) will aid the listener in determining the use of the talkgroups that he hears.

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MT



REVIEW

NITELOGGER II

By Bob Grove W8JHD

One of the most popular accessories on the scanner scene is the Nitellogger, a time compressor for recording communications off the air. It was unavailable for a while during manufacturing upgrades, but now it's back as the Nitellogger II. So, just what makes this little device so useful?

Scanner enthusiasts know the frustration of having to wait long periods of time for activity on some frequencies; they can attach a tape recorder to the scanner's audio output jack, but when the recording is played back, the long periods of silence are still there – right up until the tape runs out.

News organizations and public safety communications centers as well have a need to record activity for later review or to archive for legal reasons.

Nitellogger II is not a tape recorder, but it's an automatic, sound-activated device which starts the recorder only when a transmission is heard, thus compressing hours of monitoring time on a single tape without the long delays between transmissions. Thus, unattended, the Nitellogger II will record a considerable period of monitoring for later review in a much shorter time.

❖ The details

Nitellogger II has an impressively refined, professional look, and well it should. It is easy to use, flexible, reliable, and feature packed for every listening requirement. It comes with audio and activation cables for interconnection with the scanner and tape recorder, and includes an AC

wall adaptor as well. Designed for 12 volt power, it can also be battery-operated for mobile, portable or discreet installations.

Measuring only 4-1/2" x 3-1/4" x 2" and weighing less than a pound, Nitellogger II is a compact accessory for any location. Interface is provided by three jacks: Audio input (8 ohms nom.), audio output (600 ohms nom.), and control (switch for record activator).

Since plugging into a scanner's external speaker jack automatically disables the speaker, Nitellogger II has an internal speaker to provide audio monitoring during the recording session if desired; speaker volume level may be adjusted by a front-panel control.

Simple voice activators (VOX) often result in choppy recordings; Nitellogger II offers user adjustment of delay after sound stops from 1/4 second (250 mS) to 2.5 seconds, similar to the scan-resume delay found to be most effective on scanners. This provides a smoother recording session, avoiding the choppiness and "wow" from too-frequent motor start-ups.

The activator relay uses silver-nickel contacts to increase the lifetime of activations, typically 10 million. That should be enough for any recording session – and for years to come! The contacts can handle up to 2 amperes of current at 30 volts DC, well above normal tape recorder requirements.

❖ Let's try it out

Connecting and using the Nitellogger II couldn't be quicker or easier. The molded plugs

are inserted into the scanner and tape recorder, the wall adaptor is plugged in, and the monitor volume is adjusted for comfort while a signal (like your local weather channel) is being received. A small screwdriver (not included) is used to adjust the front-panel input level as revealed by an illuminated LED; a second LED reports the activation of the tape recorder. That's it.

But we don't always want to be recording, so rather than having to unplug the device, a front-panel switch allows instant selection of disabling the recorder, operating the Nitellogger II, or returning control to the tape recorder so the tapes may be played.

All in all, a very useful device at an economical price. Nitellogger II is available from Grove Enterprises for \$49.95; call 800-438-8155, email order@grove-ent.com, or write 7540 Hwy 64 West, Brasstown, NC 28902.

NOTICE: It is unlawful to buy cellular-capable scanners in the United States made after 1993, or modified for cellular coverage, unless you are an authorized government agency, cellular service provider, or engineering/service company engaged in cellular technology.



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Zap Checker 270

By Bob Grove W8JHD

Radio frequency (RF) field strength meters have been around for the better part of a century, but more recently these have evolved from simple detectors to active circuitry. The growing presence of wireless systems has resulted in the extension of the frequency ranges of these useful devices well into the microwave spectrum.

❖ A little primer

So just what is a field strength meter, and how is it used? In its simplest form, it is nothing more than a diode connected to a meter; the diode rectifies the signal voltage being received from a nearby emitter, and the resulting current is used to deflect the meter. The closer the meter, or the stronger the RF field, the more the needle on the meter is deflected.

More sophisticated units use solid-state circuitry to amplify the signal, as well as utilizing tuned circuitry for wider frequency range, and even offer audible and visual alarms for signal presence or high levels of RF energy.

Uses for such a small, versatile instrument are considerable: Detection of hidden transmitters ("bugs"); finding wireless surveillance cameras in countermeasures assignments; screening electronic equipment including microwave ovens for RF leakage; locating sources of RF interference to receiving systems and wireless networks; adjusting transmitter and antenna systems for maximum output; notification of an unauthorized radiat-

ing device (CB, walkie-talkie, cell phone, etc.) in an RF-quiet zone, and more.

❖ Enter the ZAP 270

Several years ago, the Alan Broadband Company, a California entrepreneurial company, developed their initial entry into this field, the ZAP 180, still a very popular field-strength device. But climbing upper-frequency limits have required the availability of detection and measurement equipment with higher sensitivity and directivity; thus, the ZAP 270.

The model 270, as shown here, draws its operating power from two AA alkaline cells (included) with an operational lifetime exceeding 60 hours – That's efficient use of power. Its two-inch analog meter is boldly printed for easy reading and is calibrated in a simple 0-100 arbitrary scale for quick reference.

A red-green LED pair gives further indication of signal presence during dim-light or nighttime conditions. A thumbwheel sensitivity control allows quick adjustment of the meter for low background (green). As the instrument is swept over a suspect area, the meter advances and the green light extinguishes as the red comes on, indicating RF presence.

For unobtrusive operations, an internal vibrator alarm can be switched on, alerting the operator so he doesn't have to continually watch the instrument during the sweep. The vibration intensifies as the source is approached.

The contoured shape provides comfortable and secure grip, and the compact size – more like a pocket flashlight – makes the instrument easy to use and easy to store. Only 5 inches long and weighing a mere 5 ounces, the 270 is easy to pack anywhere.

❖ So, what's different?

So far, the model 270 sounds much like its basic brother, the 180; both offer 10 MHz to 4.5 GHz frequency coverage and high sensitivity (covert "bug" and cell phone detection at 20 feet or more). But this is where the similarity ends – the upscale 270 includes an external antenna option for directivity.

An optional log-periodic dipole array provides some directivity and a little forward gain in the 1.8-4.5 GHz range; the antenna itself is actually capable of performance through 6.4 GHz, limited only by the upper bandwidth of the 270. Alternatively, the user

may wish to provide his own SMA-connected antenna for any frequency range in the spectrum of the agile 270.

❖ Our field test

The ZAP 270 is a breeze to use. Operation is intuitive, with clear labeling and few controls. The meter is large enough to see and the imprinting is bold black and white; the LEDs are large and bright; and the thumbwheel on/off sensitivity control is ergonomically positioned for right- or left-handed users.

A LOG/MID/LINEAR switch permits the user to select meter response from logarithmic change of strength of 1000:1 amplitude ratio, to an intermediate range of the weakest 20 dB signals, to the sensitive linear mode for signals of a 3:1 ratio in strength.

A walk-through of our home with the 270 revealed a symphony of signals, from computers and wireless networking to TVs and cordless phones. Our microwave oven was a transmitter of its own, with clearly-detectable signals 20 or more feet away.

Other, more powerful signal sources like my two-meter ham transmitter and FRS transceiver really made the 270 dance, and from considerably greater distances.

Since the microwave operates in the same 2.4 GHz spectrum as our wireless computer network, we decided try the optional antenna – a miniature, planar-array of log-periodic dipole elements etched on a printed circuit board. It is affixed to the 270 by its SMA connector.

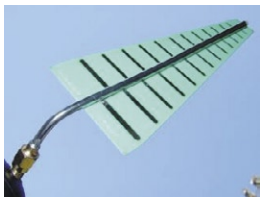
The side switch on the 270 was moved from the internal position to the SMA position and the microwave oven switched on. Sure enough, with the 270 adjusted to a threshold sensitivity (barely lighting the LED), I could move the hand-held radio direction finder around and it always favored the position of the oven. Without the antenna, the 270 was far more omni-directional.

❖ Does this replace the spectrum analyzer?

At first glance, it would seem that an agile field-strength meter like the ZAP 270 might be substituted for a far-more-expensive spectrum analyzer for certain applications like locating surreptitious transmitting devices.

While the field-strength meter does, indeed, respond to such devices, it is a broadband





device which also responds to anything in its frequency range, like computer microprocessors, power-line harmonics and digital circuitry

in consumer appliances. This can be confusing to the user unfamiliar with such properties.

Spectrum analyzers, on the other hand, are frequency-specific; they display on their

screen the discrete signal spikes from emitters throughout the spectrum, enabling their individual identification. Spectrum analyzers are also more sensitive, showing signal presence from many miles away, much like a radio receiver, which, in fact, they are.

But this is not to short-sell the field-strength meter. Properly applied as a screening device, they are effective RF-energy finders, and particularly models like the Alan Broad-band "ZAP" series with their inherent high sensitivity, extremely wide frequency coverage, and simplicity of use.

❖ The bottom line

With the limitations of any field-strength meter fully understood, the ZAP270 is sure to please. Its extraordinary wide frequency response, high sensitivity, flexibility, rugged construction, battery economy and ease of use make it a first-class choice in its field.

The ZAP 270 is available from Grove Enterprises for \$ \$259.95; the 270 with the optional 1.8-6.4 GHz antenna is \$319.95.

The Versatile Eton E10

By Gayle Van Horn

The Eton E10 is a recent entry in Eton's new Elite series of portable digital radios. This versatile model covers AM, FM and shortwave in a lightweight compact radio, perfect for travel or office use.

The E10 receives all 14 international shortwave bands (shortwave tuning coverage from 1.711-29.999 MHz), AM broadcast band (520-1710 kHz), and the FM broadcast band. A built-in telescopic antenna is used for shortwave and FM, and an internal ferrite bar antenna is used for the AM broadcast band. A mini plug jack on the side of the radio facilitates connection of an external FM or long wire shortwave antenna.

The various tuning aids in the E10 include a direct keypad frequency entry, scroll wheel, and up-down tuning buttons. You can select fast or slow for manual tuning. The up-down buttons allow you to band scan, automatically stopping on the next station encountered. Shortwave stations can be tuned in 1-kHz or 5-kHz increments. Mediumwave tuning is selectable between 9kHz/10kHz.

The bandwidth button is used when listening to SW or AM stations, to minimize interference. When shortwave listening, the SW IF SET button can shift the intermediate frequency to help minimize interference. For extra "matching" of the antenna to the radio, the E10 includes an Antenna Trimmer Control knob to optimize the model's telescopic antenna when listening to shortwave.

An added feature is the ten pages of memory, each page holding 50 frequencies. This enables storing of 500 frequencies in memory for scanning. The factory presets a memory bank, which may be used or reset using a direct entry of the numeric keypad for your personal listening needs. I found the Memory Auto-Scan especially helpful when checking for preset favorite stations.

Frequencies are displayed in a large backlit LCD, while signal strength is indicated via a five-level graph bar. The radio's back stand proved helpful for

table top or "hand-held" listening. The interval speaker provided a rich audio tone with loud, crisp and good audio levels. A set of ear buds are included for private listening and stereo reception in the FM mode.

In recent testing and monitoring, I discovered an above average radio with a dynamic range for a low end portable. FM reception was exceptional, as well as medium wave reception from foreign station in the Caribbean and Mexico.

Shortwave reception among the international power-houses and tropical band stations proved impressive for this portable radio. Though not a "DX-machine," it proved impressive in monitoring stations with good to very good signal strengths at levels comparable to a lower-cost table top receiver. Band scans in the 41, 31, 25, 49, 19, 22 and 16 meter bands indicated better than average signal strengths for general program listening.

Other features of the E10 include a 12/24 built-in clock, which may be set for either format, and the snooze feature to wake you up to a preset station or the last one tuned. Other refinements found on the side of the radio include a DX-local switch, tone button, and FM/SW external antenna jack. The E10 operates from four rechargeable 1100 mAh Ni-MH AA batteries that may be charged inside the radio with the supplied AC wall charger.

For the FM, AM or shortwave listener



seeking an affordable portable digital radio, the new E10 is just what you're looking for. Whether for travel, the office, bedside or carry-along, this is a terrific radio. The complete product kit includes a protective case, wind-up antenna, owners manual, four AA batteries and product booklet.

The E10 is available for \$130.00 USD via the Eton website <http://www.etoncorp.com>. For additional information about the E10 or other Eton products, call 1-800-872-2228.

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Radio Shack Pro-2096

By Larry Van Horn, N5FPW

It is a debate as old as the scanning hobby itself. Who makes the best scanner? Which scanner is the best one in the marketplace? What scanner should I buy?

Get a group of 10 scanner hobbyists together in one room and you will probably get 10 different answers. A lot of that variance is due to the listening habits of the hobbyists themselves and the various radio systems available to monitor in each one's local area.

There is no "one size fits all," easy answer to the questions above. But there is one fairly universal constant we can point to: Over the last few years we have had more "receive capability" packed into our new scanners than at any other time in the history of the hobby. This new capability is due in large part to the technological advancements of the two major scanner manufacturers: Radio Shack (GRE) and Uniden.

Although having a scanner that can monitor a significant portion of the radio spectrum is a plus, if the scanner can't decode signals in those bands into usable audio for the listener, having that extended frequency coverage is useless. Fortunately for the radio hobbyist, these two manufacturers have pushed each other and the limits of technology in order to provide the radio community with some of the most advanced scanner products ever offered. When it comes to "receive capability" Uniden and Radio Shack rise to the top of the receiving market heap.

This month we look at one of the most recent of these new products: the Radio Shack Pro-2096.

❖ The Pro-2096: Top Features

The Pro-2096 has a lot of capability packed in its small package. In addition to scanning conventional frequencies programmed into the scanner, it can handle most of the major trunk protocols that the scanner user will encounter in the field, with one notable exception. The 2096 can track most of the Motorola trunk systems on-the-air today, including: Type I, II, III Hybrid, and APCO 25 phase 1 digital systems (including 3600 bps and 9600 bps control channel systems using the C4FM and CQPSK modulation schemes) and M/A-COMs EDACS systems. However, the 2096 cannot track any of the Johnson LTR trunk systems used by local businesses and a few public safety agencies.

Like its sibling the Pro-96, the military aircraft band can be opened up using Don Starr's WIN96 software at <http://www.starrsoft.com/software/Win96/>. While we didn't have a chance to check out the performance of the 2096 in the 225-400 MHz band, field reports from some Milair monitors at airshows indicate that the Pro-96 is not very sensitive in this band. Since the 2096 is based on the same RF configuration, we will probably see similar results with the 2096.

Unlike the first generation of trunk scanners (e.g., BC-895), the user can scan conventional frequencies and trunk systems, instead of just one or the other. The 2096 scanner will also decode conventional digital APCO 25 frequencies.

Some of the other major features of this scanner include six preprogrammed frequency ranges: Marine, CB, FRS/GMRS/MURS, Police/Fire, Civilian Aircraft, Amateur Radio, and one limit search (user configurable). Another nice feature is the ability to copy active frequencies found during frequency searches into a memory channel. Also, like many other recent scanner product releases, the 2096 has weather alert and SAME signal decoding capability.

The 2096 has two types of storage memory. Working memory (500 channels) is the memory that your scanner uses while you are programming, cloning, or actively listening. The other memory is the most-touted feature of the Pro-2096: the V-Scanner (Virtual Scanner). This feature allows you to edit, store, recall and use up to 11 full sets of

scanner memory profiles. With V-Scanner, it is possible to create separate scanner memory profiles for different areas you visit or for different ways that you use the scanner.

One final feature of note is the 2096 digital AGC (Automatic Gain Control). You may find that audio levels vary greatly among different users on digital systems. The Pro-2096 includes a digital AGC that can help compensate for these low audio levels when they occur. This function is selectable and will have no effect on analog transmissions.

❖ What's in the Box?

In addition to the Pro-2096 scanner, you will get a whip antenna, AC adapter, DC cable with fuse (cigarette-lighter adapter optional), two mobile mounting brackets (conventional mount with side knobs and DIN sleeve and 2 keys), mounting hardware, quick start guide, users guide, and preloaded data addendum.

❖ Overall Rating and Final Thoughts

There is a lot of scanner here for the money. Overall, I like the Pro-2096. I do have a few complaints that potential buyers should note. First, there's no LTR trunking capability. If you have a public safety agency or business that uses LTR trunking, you will have to conventionally scan that system. Second, there is no military air coverage (see text above). Third, unlike most of the Uniden trunk trackers, there is no built-in computer interface or software (see specifications below), and no flash updating of the scanner firmware. And, while the screen is nicely laid out, it is small and somewhat difficult to read. If you are visually impaired you will have trouble seeing this screen.

If you purchase the 2096 and use it for trunk tracking a Motorola 800 MHz analog trunk system, the FCC rebanding of the 800 MHz band may become an issue at some point. Once a local agency has been rebanded, the unit will no longer trunk track that system and the unit will have to be sent back to Radio Shack to update the firmware.

Looking past the issues above, I like the Pro-2096. It is an excellent scanner and worthy of a spot in your shack. The manual is one of the best I have seen, scanner performance is very good, and the unit is very easy to program and use.



MT Rating: Four Stars



MT First Look Rating (0-10 scale)

Audio Quality.....	8
Audio Levels.....	8
Backlight/Display	6
Ease of Use.....	9
Feature Set	7
Keyboard/Button Layout	8
User Guide	9
Overall Reception.....	8
Sensitivity.....	8
Selectivity.....	8

Table One: Pro-2096 Specifications**Frequency Coverage**

Frequency Range (MHz)	Programming/ Search Step Value
25.000-54.000 MHz	5 kHz
108.0000-136.9875 MHz	12.5 kHz
137.0000-174.0000 MHz	5, 6.25 or 7.5 kHz
216.0025-221.9975 MHz	5 kHz
222.0000-225.0000 MHz	5 kHz
406.0000-512.0000 MHz	6.25 kHz
806.0000-823.9875 MHz	6.25 kHz
849.0000-868.9875 MHz	6.25 kHz
894.0000-960.0000 MHz	6.25 kHz
1240.000-1300.000 MHz	6.25 kHz

Memory Organization

V-Scanners: 11 500-channel virtual scanners
 Memory channels: 500
 Channel storage banks: 10
 Number of channels per channel storage bank: 50
 Talkgroup ID memories: 1500
 ID memory banks: 10

Sub-banks per bank: 5
 Number of memory IDs per sub-bank: 30

Sensitivity (20 dB S/N)

FM mode:	
25.0000-54.000 MHz	0.3 μ V
108.0000-136.9875 MHz	0.3 μ V
137.0000-174.0000 MHz	0.5 μ V
216.0000-225.0000 MHz	0.5 μ V
406.0000-512.0000 MHz	0.5 μ V
806.0000-960.0000 MHz	0.7 μ V
1240.000-1300.000 MHz	0.7 μ V

AM mode:

25.000-54.000 MHz	1 μ V
108.0000-136.9875 MHz	1 μ V
137.0000-174.0000 MHz	1.5 μ V
216.0000-225.0000 MHz	1.5 μ V
406.0000-512.0000 MHz	2 μ V
806.0000-960.0000 MHz	2 μ V
1240.000-1300.000 MHz	3 μ V

Selectivity

25.000-27.995 MHz in AM mode
 -6 dB \pm 5 kHz
 -50 dB \pm 6 kHz
 All other frequencies in AM and FM mode
 -6 dB \pm 8 kHz
 -50 dB \pm 14 kHz

IF Rejection

380.8 MHz at 174 MHz	60 dB
21.4 MHz at 174 MHz	100 dB
Spurious Rejection at 174 MHz FM	40 dB

Scanning Speed and Delay

Scanning Rate: Up to 60 channels per second
 Search Rate: Up to 75 steps per second
 Conventional Channel Delay Time: 2 seconds
 Priority Sampling: 2 seconds

Trunking Talkgroup Delay Time: User configurable

Intermediate Frequencies (IF)

1 st IF	380.7275 to 380.86875 MHz
2 nd IF	21.4 MHz
3 rd IF	455 kHz

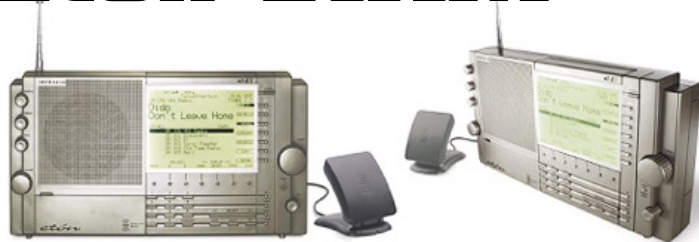
Squelch Sensitivity

Threshold (FM and AM)	0.5 μ V
Tight (FM)	25 dB
Tight (AM)	20 dB

Miscellaneous Specs

Antenna Impedance: 50-Ohms
 Antenna Jack: BNC
 Antenna (included): Five section 26.5-inch telescopic antenna
 Attenuators: Channel and search band selectable, global attenuator
 Audio Output Power (10% THD): 1.5 watts
 Built-in Speaker: 3-inch (77 mm) 8 Ohm dynamic type
 Computer Remote Control Jack: 1/8-inch mini jack (3.5 mm) used for cloning/programming. An optional Scanner/PC interface (20-289) can be purchased for \$24.99 on the Radio Shack website.
 External Speaker Jack: Yes
 Headphone jack: Yes
 Mode Selectable: Yes
 Operating Temperature: -4 to 140°F (-20 to 60°C)
 Power Requirement: 13.8 volts, current drain 600 mA, center pin positive
 Physical Dimensions (HWD): 21/4 x 71/4 x 55/16-inches (55 x 185 x 135 mm)
 Reset: Manual reset button on the rear deck of the scanner.
 Weight (without cabinet and accessories): 27.7 oz. (790 g)
 Note: These specifications are typical and individual unit specs will vary.

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Its selection of modes (AM, FM stereo, USB/LSB) assures total signal recovery, with functions all displayed on a giant 5.7 square inch LCD display. Up to 1700 memory locations with alphanumeric readout are accessible, with scanning capability as well.

High sensitivity, fine tuning (10 Hz steps), wide dynamic range, IF passband tuning, and selectable bandwidths (7.0, 4.0, 2.5 kHz) guarantee superior reception in crowded band conditions, with selectable-sideband synchronous detection improving interference rejection and fading signals.

Other advanced features include calibrated LCD S-meter, selectable AGC (fast/slow), dual-event programmable clocks with WWV time set, separate bass and treble controls, stereo line-level input and output jacks, built-in antennas and external antenna jacks and more.

Measuring 13-1/8"W x 7"H x 2-1/2"D and weighing 4.2 lbs., the new Eton X1FM is powered by four D cells (not provided) or 120 VAC wall adaptor (included).

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Worth Another Look

The SDR-1000 with an “Approved” Sound

Recently, in a series of *MT* feature articles, the topic was Software Definable Radios (SRD), possibly the greatest change to radio technology in the past 100 years. One of the SDRs we looked at was FlexRadio Systems’ SDR-1000 transceiver. However, I may not have given it a fair shake.

As the saying goes, penny wise and pound foolish. During my initial look at the SDR-1000 I went against FlexRadio’s suggestions and attempted to use an on-motherboard sound card. What a waste of time! The results were confusing, ever changing and ultimately useless.

In the operation of the SDR-1000, the PC’s sound card is a key element. The SDR-1000’s performance – dynamic range for example, is greatly influenced by the sound card’s performance. FlexRadio clearly lists the sound cards they have tested, support, and therefore which allow optimal performance of the SDR-1000. But when I looked at the price of these cards the cheapest was around \$100. Being frugal, I decided to dig out my PC card inventory and try a few of my old sound cards. One, an inexpensive Aureal Vortex PCI sound card “worked” and I used it for running the SDR-1000 in the feature article.

I had a nagging worry that perhaps I was not giving the SDR-1000 a fair chance. After all, every time I spoke with the good people at FlexRadio they would courteously but “strongly suggest” that I use one of their approved sound cards. But my sound card seemed to work, especially compared to the miserable results that I had with the on-motherboard sound card.

❖ I Get Feedback

After the third part of the SDR feature was published I began getting feedback from hams who had tried using unapproved sound cards

which worked. But they found a “huge performance difference” when they broke down and bought one of the sound cards on the FlexRadio list. My worry seemed to be well founded. But the cost of the approved sound cards, starting at around \$100 still did not fit in with my fiscally responsible philosophy ... call it what you may!

With these facts in the back of my mind, over the next few months I began to regularly watch the market price for FlexRadio’s approved sound cards. I entered them as “Favorite Searches” on eBay and checked the going price periodically. But even used, their prices were holding in \$60 + range.

Then recently, I received an email from a major on-line computer store advertising the Turtle Beach Santa Cruz sound card at \$42 including shipping. I immediately recognized this sound card as an approved FlexRadio card. Again, with my “fiscally responsible philosophy” I checked the prices of used Santa Cruz cards on eBay.

When I saw that they had fallen into the thirty-dollar range including shipping and handling, I *knew* it was time to get one. Watching the auctions for another week, I finally grabbed one at \$24 including shipping. Now a Flex Radio Systems “approved” sound card was very affordable! So, let’s see how to install and use the Turtle Beach Santa Cruz sound card with the SDR-1000. Then we’ll see its effect on SDR-1000’s operation.

❖ Installation

First, remember to disable any on-board sound cards, usually done via the BIOS setup. Uninstall existing PCI sound card software drivers using Windows Control Panel. Or use the “uninstall” function in the old sound card’s program folder. Shut the PC down, remove the AC cord, and then remove the old sound card.

Next, install the Santa Cruz sound card in a PCI slot in your PC. Try to keep it away from the video card where it may pick up unwanted signals.

Using the included instruction manual and CD from Turtle Beach, the installation was quick and easy on my Pentium III, 1GHz PC, running Windows XP Professional.



Figure 2 - Power SDR setup screen - With a Santa Cruz sound card it's a snap!

Remember, follow the few simple steps in the manual *exactly and in the exact order*. Your Santa Cruz card sound should now be operational and ready to use with the SDR-1000.

❖ A Quick SDR-1000 Overview

The SDR-1000, Software Defined Radio (SDR) transceiver operates as a general coverage receiver in the range 11 kHz - 65 MHz. Modes of operation include: AM, Sync AM, USB, LSB, DSB, CW and FMn. Filtering for DRM mode is included and will interface to the commercially available DRM software. See the November 2004 *MT* article SDR Part 1 for a detailed description of SDR-1000, including a block diagram.

The functions of an SDR-1000 are defined in software and it uses open source software code for programming the digital signal processing chip (DSP) and its control software. As such, a knowledgeable user can modify or add features/functions to the SDR-1000. Of course, these will be limited by the hardware.

❖ SDR-1000 Hardware

A true Black Box, the SDR-1000 is housed in a black metal enclosure (see Figure 1), measuring 10" W x 8½" D x 4" H (25.4cm x 20.8cm x 10.2cm). It requires a 13.8 VDC power supply capable of providing 1.25 amps. The SDR-1000's front panel is simplicity itself with just an on-off switch and a microphone jack. The back panel has an antenna connector, the parallel port and jacks for the input to the left and right channels of the sound card.

The SDR-1000 includes a transmitter that covers the 160 meter to 6 meter ham bands with a 1 watt peak envelope power (PEP) output. The price is \$875 plus shipping. A receiver-only version is also available from Flex Radio Systems.



Figure 1 - The black box SDR-1000

See <http://www.flex-radio.com> for pricing and details. Again, for details of the SDR-1000 operational circuitry see "Software Definable Radios Parts 1, 2 & 3" (also available on line under Reviews 2004 & 2005 at <http://www.monitoringtimes.com>).

❖ Power SDR

The software that runs the SDR-1000 and is provided on the Flex Radio site is called Power SDR. Flex Radio continues to produce new versions of the software in an effort to improve and expand the performance of the SDR-1000. Although version 2.0.0 was about to be released, it was not ready for this article deadline. So we used version 1.1.9. This Zip file is a little over 1.1 MB in size, which allows it to be stored on a floppy.

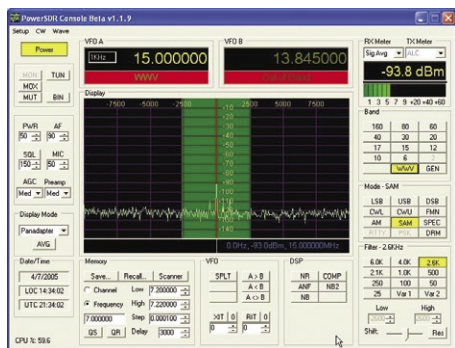


Figure 3 - Power SDR Version 1.1.9 main operating screen. Notice the "preamp" control on the left and the level of the background noise.

After unzipping and installing Power SDR it then guides the user through a set of set-up questions. Figure 2 shows exactly how easy it is, if you have an approved sound card such as the Turtle Beach Santa Cruz. Just highlight its name and hit "Next."

As seen in Figure 2, Flex Radio supports five other sound cards in addition to the Santa Cruz. For supported sound cards all audio parameters are pre-determined and require no user intervention. And best of all, the SDR-1000 works great the first time. No messing around with a number of interactive parameters and then wondering if the performance is optimal. It's all done for you by the Power SDR program.

❖ More Power SDR to You

Once you answer the four or so set-up questions, the main Power SDR screen is displayed, Figure 3. A number of important changes have been made in the 1.1.9 version as compared to

the version used in our original review. One of the most impressive improvements is the automatic linking of three functions: IF (gain), Attenuator and Gain. The three have been combined into the "Preamp" setting, at the left side of the screen of Figure 3. This new feature makes operation much simpler, while maintaining optimum receiver performance. For most monitoring situations I found that the "Med" (medium) setting gave the best results.

❖ Frequency Calibration

The frequency calibration routine has been greatly simplified in version 1.1.9 requiring no math calculations. All it takes is a strong signal of known frequency, for example, WWV at 10.000 MHz. Clicking the frequency "Start" button found on the "Setup" menu's "General" tab screen, does it all in one quick action. These changes will be included in version 1.2.0.

❖ Exact Level Calibration

For the purists among us (read pedantic geeks) who put their faith in absolute measurements (in a relative world) the SDR-1000 can fit the bill. The SDR-1000 can directly provide "exact" signal and noise measurements. However, first it must be calibrated using a standardized signal generator. If you don't have a thousand dollar calibrated signal generator lying around the house, there is a \$39 alternative.

The XG-1 calibrator kit from Elecraft generates a fixed-frequency 7.040 MHz signal with "highly-accurate 1 microvolt and 50 microvolt output levels." This is a kit, so some dexterity with a soldering iron is required. However, the six page manual is very well written. The one page of step-by-step, detailed assembly takes between one to two hours to accomplish inserting and soldering the thirty components. See Figure 4 for the XG-1's fully assembled printed circuit board.

I would put the required electronic construction ability somewhere between intermediate and beginner. I didn't find any component particularly difficult to solder to the board. The manual includes simple ohmmeter testing procedures to verify correct assembly, so you don't need to turn the XG-1 on and blow it up to find that you have a problem. The XG-1's output is clean and constant in frequency and level.

The other pages of the manual describe the circuit and detailed procedures for using the XG-1 to test receiver sensitivity, S meter calibration and signal to noise measurements. At \$39 (plus shipping) this tiny (1.5"W by 3.5"L) XG-1 is quite a useful device for Hams or SWLers. Check out the XG-1 and their other products at the Elecraft website <http://www.elecraft.com>. Tell them you saw it in *Monitoring Times*.

The XG-1 can be used to calibrate the SDR-1000's frequency and signal level to high degree of accuracy. This is simply done via two clicks in the Power SDR "Setup" menu's "General" tab screen.

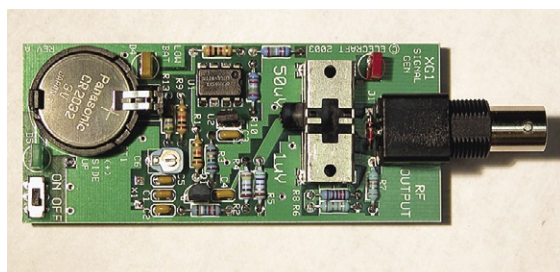


Figure 4 - Elecraft's XG-1 - The \$39(!)precision signal and level calibrator (after assembly)

❖ Sound (Card) Differences

The most obvious difference that the Santa Cruz sound card made to the SDR-1000's operation was in the background noise level. It was noticeably quieter, as can be seen in Figure 3's spectrum display, showing the noise floor down below -94 dBm. The Santa Cruz sound card also gives an improved signal to noise level, which was very obvious on weak signals. The signal in Figure 3 - a very, very weak WWV on 15 MHz - was completely "copyable." In my opinion, the Santa Cruz greatly improves the performance and operational stability of the SDR-1000 as compared to my non-approved and unsupported sound card.

❖ Always Improving

There is no question that the Turtle Beach Santa Cruz sound card made a big difference in the performance of the SDR-1000, just as Flex Radio indicated to me many months ago. To all the people that emailed me saying that would be so, all I can say is, you were right!

The 1.1.9 version is another positive factor in the SDR-1000's improved performance with its simpler gain and attenuator controls and other enhancements. Version 2.0.0 (estimated release date 10 April 05) will retain all of V1.1.9 features and add some. For starters, in version 2.0.0 the AGC has been tailored to produce cleaner audio and professional sound cards have been added to the approved auto set-up list.

Check Flex Radio Systems' website at <http://www.flex-radio.com> for the latest version of Power SDR and product information on the receive-only SDR-1000/ROE. Till next month. Keep sending me your input. I AM listening.

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This volume contains information about current security technology used by cable and satellite providers. This information is not available elsewhere.

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What's NEW

Tell them you saw it in Monitoring Times

Portable Antenna Rotor

Ed Yeary clued us in to a nifty little antenna rotor. The unique antenna rotor from K1CRA runs on just four AA batteries and has the power to turn most small antennas 360°, making it perfect for motor homes, camping, contesting/roving, emergency communications vehicles and more!



The rotor comes supplied with a hand-held remote control and 10 meters of connecting wire, three-piece bottom mounting bracket and a top mast bracket.

The rotor is completely weatherproof and can be mounted permanently for use with TV, WiFI, VHF and UHF antennas. The price is \$49.95 from the K1CRA Radio Store, 5435 South Abbott Road, Armor Plaza, Orchard Park, NY 14127; call 716-648-2660 for information or visit <http://www.k1cra.com/>

Eton's Portable G4000A

The stylish new Eton/Grun-dig G4000A silver portable radio receives AM, FM, continuous Shortwave, and even SSB (Single Sideband) radio. Other features include: wide and narrow bandwidth filter controls, auto scan, direct keypad tuning, 40 programmable station presets, clock, and sleep



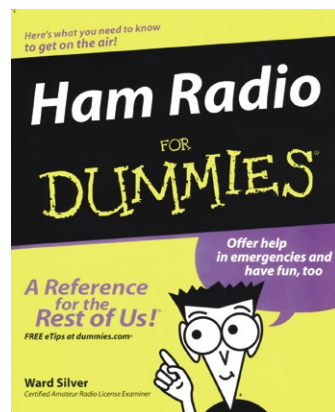
timer functions.

The G4000A ships with an owner's manual, operating instructions, carrying case, earphones and AC adaptor for North American use. Dimensions are 8"W x 4.8"H x 1.5"D. It weighs 1lbs. 5oz. and uses 6 AA batteries (not included) or AC adaptor (included).

The Eton G4000A is \$149.95 from Grove Enterprises (<http://www.grove-ent.com>; 1-800-438-8155) and other dealers. Look for a review in an upcoming *Monitoring Times*.

Ham Radio for Dummies

As I know only too well, there's a big difference between passing the test for an amateur radio license and actually getting on the air. And part of the reason is feeling like a dummy when it comes to being responsible for the actual operation of a station. *Ham Radio for Dummies* by Ward Silver (a columnist for *QST*) is a no-nonsense, plain English approach to getting new amateur radio operators on the air.



This is not a study guide for getting licensed, though it will show you how to do that. Part 1 is a quick introduction to amateur radio and its mission, the basic technology behind radio, and an overview of the ham community and its various organizations. Part 2 walks the reader through the process of getting one's license and what to expect when taking the test.

But then we get to the good stuff. Part 3 is loaded with practical information on the different modes and etiquette of operation

under various circumstances, such as casual contacts, contesting, net check-ins, or emergency communications. Part 4 tackles how to build a station that works and how to get it on the air.

In Silver's own words, "I am active in training volunteers for emergency communications and while many have a scanner or may use an FRS handheld, they are all interested in learning more about ham radio. The book was written both as the interested layman's introduction to ham radio and as a desktop reference for the newly-licensed."

Naturally, the book is loaded with references and resources for additional information. But clearly the book's primary intent is to help new amateur radio operators develop the confidence to get on the air with good operating skills and equipment.

The 380-page *Ham Radio for Dummies* is \$21.99 from <http://www.dummies.com> (where you can also download a sample chapter) or check your local book store for ISBN 0-7645-5987-7 by Wiley Publications.

— Rachel Baughn

Tourist Trains

Few sights and sounds are as evocative as an old steam locomotive. It is this common experience that drives collectors, museums and even tourist railroads to continue their pursuit of a fading era. Scanner enthusiasts frequently tune in on communications between the terminals and the trains.

The Empire State Railway Museum has released their latest (2005) *Annual Guide to Tourist Railroads and Museums*, a photo-punctuated directory of more than 500 railroad attractions across the U.S. and Canada. Listings include locations, descriptions, schedules, admissions, and a brief inventory of their locomotives and rolling stock. Several pages of guest coupons are also included.

You can order *Tourist Trains*

2005 for \$17.95 from Kalmbach Publishing Co. by phone at (800) 533-6644 (262-796-8776 Ext. 421 outside the US and Canada) M-F 8:30-5:00 Central Time, via the website at <http://store.kalmbach.com>, or write for a catalog to Kalmbach Publishing Co., 21027 Crossroads Circle, P.O. Box 1612, Waukesha, WI 53187-1612.

— Bob Grove

ARRL Repeater Directory

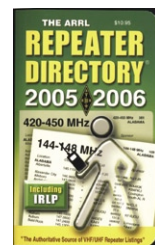
If you plan on traveling this summer, a handy pocket guide to carry with you is the *ARRL Repeater Directory*, newly updated for 2005-2006. This 34th edition has been completely revised, based on information from frequency coordinators throughout the US and Canada.

The pocket-sized book includes exhaustive listings of 19,828 repeaters and all related information pertaining to the system location, frequency(ies), callsign, sponsor, who may access the system and how. Background chapters cover general operating guidelines, band plans, and a list of frequency coordinators.

Although packet and foreign listings are no longer listed in the book, repeaters for Amateur Television (ATV) use and Internet Radio Linking Project (IRLP) nodes are now included. The digital packet listings have been moved to the Tucson Amateur Packet Radio Corporation (TAPR) website and foreign listings can be found at the Amateur Radio Relay League (ARRL) website and elsewhere.

The *ARRL Repeater Directory* is available for \$19.95 from the ARRL, 225 Main Street, Newington, CT 06111-1494; <http://www.arrl.org> or call 1-888-277-5289.

— Rachel Baughn



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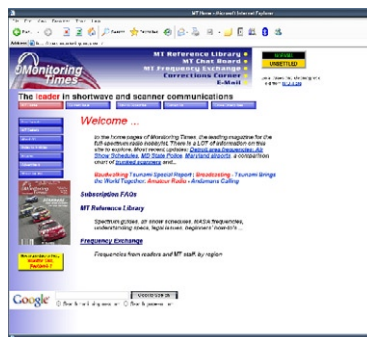
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